News of the Industry Begins Page 906

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AUTOMOTIVE INDUSTRIES

VOLUME 54 *Philadelphia, Thursday, May 27, 1926* NUMBER 21

Parts and Accessory Men Mobilizing to Put Business on Firmer Plane

Officials of M. & A.M.A. discuss problems with manufacturers at series of regional meetings. Firm stand on fair prices and broadening of markets suggested

By John C. Gourlie

THE searchlight was turned on the fundamental problems—some of them new, others nearly as old as the industry—of automobile parts and accessory manufacturers at the series of sectional meetings of the Motor and Accessory Manufacturers Association held last week in Cleveland, Detroit and Chicago. One member after another rose and related his experiences or urged action against the conditions that bar the way to adequate profits and beset the business with more than its just share of uncertainty and hazard.

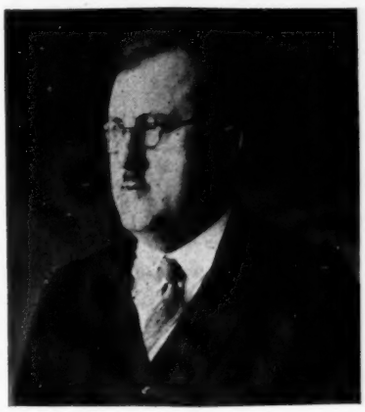
When, after some hesitation, several members at the Chicago meeting brought to light the situation that is causing the gravest concern today to those companies that sell both to car manufacturers and the trade—the trend toward distribution by vehicle makers to their dealers of accessories and parts units at big discounts—then there was no doubt of the determination of the members to delve to the bottom of their troubles.

Important among these, in addition to the one just mentioned, are:

1. Depression of prices through excessive competition to a point where adequate profits are unusual even when quantity is maintained.
2. Tendency among some vehicle manufacturers to make radical changes in shipping schedules at a moment's notice, making economical operation of the suppliers' plants very difficult.

More than ever before, it was made evident, these manufacturers are eager to cooperate in the betterment of business conditions, and by a plan probably unique in the history of automotive manufacturing the association brought its members measurably closer to a basis of mutual understanding. Through the sectional meetings a large proportion of the membership was enabled to meet without loss of time, and by the elimination of lengthy set speeches it was possible for everyone to engage in the sort of round-table discussion that was productive of ideas and information for the improvement of conditions and the extension of the services of the association.

In the informal atmosphere of the meetings, the members were more disposed to talk unrestrainedly of their grievances—to tilt against the dragons of unsatisfactory distribution conditions, unfair trade practices and uncertain production costs and schedules. This was equally true of the conversational groups which met over dinner tables and in the halls and lobbies of the hotels.

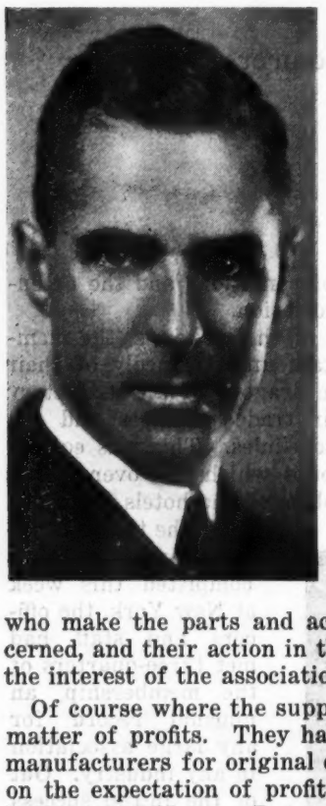


By the time the circuit of meetings was completed this week at New York, the officers and staff had met three-quarters of the membership, an unusual record for any large association in any industry. Out of the initial success of the experiment, it is probably safe to predict, will come further sectional meetings twice a year, and more group meetings of members primarily interested, for example, in replacement parts, or accessories, original equipment or service equipment. Although there is a large central meeting-ground for all the members, some problems are of course of particular concern to one

Above—H. L. Horning, president of the M. & A. M. A., who led the officials of the association on their tour of the principal cities to discuss the future of the parts and accessory business with manufacturers. Left—M. L. Heminway, general manager of the M. & A. M. A.

or the other of the groups and this was a thought expressed more than once.

There really is a lot to be done. There are trade and production disturbances to be settled, misunderstandings to be cleared up, and good will established. Without going into the tangled equities of the situation, it is obvious that the trend among car and truck manufacturers already noted, if pursued aggressively and extended, will result in sweeping changes in the field of distribution that will affect all branches of the automotive industry. The men who make the parts and accessories are intimately concerned, and their action in the situation properly becomes the interest of the association that represents them.



Above—M. A. Moynihan, M. & A. M. A. director, who attended the sectional meetings and talked to the manufacturers about the association's credit service

Left—Neal G. Adair, manager of the sales development department, related plans for group meetings and researches to assist manufacturers of kindred parts

Of course where the suppliers are hit hardest is in the matter of profits. They have been selling to the vehicle manufacturers for original equipment at low prices based on the expectation of profits through replacement distribution to jobbers. But when the manufacturer overspecifies and turns the surplus into his distributor and dealer organization at discounts as low or lower than those given the jobber, the plight of the parts or accessorries maker becomes indeed serious.

If prices were universally on a satisfactory basis, drastic measures would not be called for. But the profit margin in the parts industry is as low as it ever was—in some cases lower—and the tremendous volume of the business of the last eight or ten months has hardly brought earnings to a safe and sure level.

Perhaps the most fruitful suggestion for the alleviation of the condition outlined was that various groups draw up uniform contracts that would discourage sales in excess of original equipment requirements. It was pointed out that the steel industry has arrived at a contract form which protects seller as well as buyer to the full extent permitted by law.

Although the difficulty of obtaining universal adherence to such a contract form was brought out, the point was made that any manufacturer who went contrary to the best interests of his industry could not expect to survive very long, and that, furthermore, most of the vehicle makers were fair-minded men and could be depended upon to support a movement that would affect them all alike and which would make for stability in their sources of supply.

Just how far the new policy of some of the car makers of distributing accessories through their dealers would be pursued was a subject of discussion. The opinion was expressed in more than one responsible quarter that any effort to eliminate the jobber was doomed to failure, because the jobber usually finances the dealer when he sells him accessories or equipment, and this the car manufacturer cannot readily make provision for.

Another virtue seen in the suggested uniform contract was the reduction or elimination of losses through hold-ups in shipments and failure to specify parts requirements far enough ahead, another of the serious problems of the industry. Under current conditions, it was emphasized, the difficulty of maintaining a semblance of regularity in production schedules was unusually insuperable.

This, of course, is not a new difficulty, but it would appear to be a little worse than formerly because of the strenuous efforts being made by all the vehicle factories to keep down inventories, turn over stocks quickly, and be prepared at all times for a turn in the sales market that would mean rapid curtailment of production.

While there is no disputing the soundness of the car and truck factories' policy in this respect, there is no denying that it works a hardship on the equipment maker. He too has to operate efficiently, in this day of close margins of profit, fierce competition and large investment in machinery Likewise he has to buy materials in large quantities to keep down his costs. But how is he going to do it if he cannot tell what his shipments are to be two weeks in the future?

Difficulty Can be Overcome

There does not seem to be any ineradicable difficulty here, however. The car or truck manufacturer ought to be able to tell fairly accurately what his requirements from a parts maker are to be for at least a month ahead, and whenever production schedules are to be changed the parts maker should be warned as quickly as possible. Many of the vehicle producers follow these principles of fair play and they gain the good will and contribute to the efficiency and stability of their sources of parts supply.

But to be changing shipping schedules virtually from day to day and to be constantly holding up shipments already ordered, as is the practice in some cases, would seem to be inexcusable. Such practices usually mean inefficiency on the part of the buyer.

The old complaints that car manufacturers are playing the equipment makers against each other, keeping profits to unsatisfactorily low levels, and that on many items cost rather than quality was the primary consideration of the buyer, were discussed frequently. Suggestions for the betterment of these conditions mainly revolved about two points:

1. The individual maker ought to stand firm on a fair price or give up the business and go into some more profitable line.

2. Diversification of outlets, and broadening of the market through direct appeal to the trade and public would liberate the parts maker.

But it was acknowledged that these problems of the equipment manufacturer required a great deal of study

S. D. Black, of the Black & Decker Mfg. Co. He is a director of the association and accompanied the party on its tour

and it was considered that they would be proper subjects for the group committees to discuss.

A complaint heard frequently, and especially from those accessory makers who sell exclusively to the trade, was that the number of makers was so great and competition so keen that it was difficult to sell on any other than a price basis. To some extent the equipment maker was faced with the same difficulty. It was brought out, for instance, that there are about 250 manufacturers of bumpers, most of them trying to undersell the other.

It is likely that the situation thus presented will be made the subject of group meetings. But it was emphasized several times that the manufacturer genuinely desirous of selling on a quality basis ought to build up a demand for his product, through advertising to the trade and public, that would free him from the bondage of prices that render quality output impossible. More attention to distribution and less to production was urged by several speakers and in general there seemed a wider realization than usual that the single big problem of the industry today could all be covered under distribution.

That distribution methods will be given a large measure of attention under the new plan of the association and the expanded sales development department under the Neal G. Adair as manager was made evident. The thorough and profitable exploitation and development of markets, cherished as an ideal, cannot become a fact without adequate knowledge.

C. H. L. Flintermann, of the Michigan Steel Casting Co., is another director who attended the meetings

Despite the conviction that the fundamental conditions of the industry would bear a great deal of improvement, the present business situation was generally described as very good—at least so far as volume was concerned.

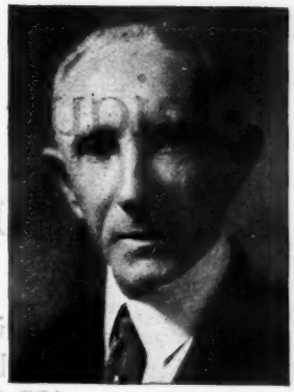
"If we look honestly at business we can see no reason to complain," said H. L. Horning president of the Waukesha Motor Co., and president of the M. & A. M. A. in his opening talk. "There are already signs of increased production in June, after a slight recession in May. Industry generally is active and when hogs went to the highest price in years the other day that meant prosperity for large sections of the farming community.

"The public is willing to pay more for a good car, which is not only a sign of good business but an important sign for the car maker and the parts maker. The big question today is whether to cut prices or to give better cars and the public is going to give the answer.

"By the same token we ought to be devoting ourselves to developing public appreciation rather than selling on price. By creating a public demand we release ourselves from dependence on a few outlets. It has been our strength that we are specialists and our weakness that we have sought to find outlets rather than developing markets."

The trend of the industry, which should be followed by parts makers if they would increase their business. Mr. Horning described as follows:

1. In a few years the use of stabilized fuel—fuel of high compression quality as a result of selection, blending or special preparation—will be almost universal.
2. Smaller engines with better acceleration, more power and greater economy.
3. Better transmissions, easier to shift, with improved gear ratios.
4. Lighter cars, made possible by better spring suspension.



L. M. Wainwright, Diamond Chain & Mfg. Co. and a director of the M. & A. M. A.

The series of meetings revisualized the comprehensive services of the M. & A. M. A. in assisting members to develop sales and protect profits. Officers, directors and the association staff, who made the circuit of all four cities, reviewed the twenty-two years' history of the organization, described the work now going on and outlined future plans.

All meetings were presided over by Mr. Horning. Directors present at one or more meetings, in addition to Mr. Horning, included C. H. L. Flintermann, Michigan Steel Casting Co.; L. M. Wainwright, Diamond Chain & Mfg. Co.; M. A. Moynihan, Gemmer Mfg. Co.; A. H. D. Altree, American Bosch Magneto Corp.; J. M. McComb, Crucible Steel Co. of America, M. B. Ericson, Biflex Products Co., and S. D. Black, Black & Decker Mfg. Co. Staff representatives included M. L. Heminway, general manager; Neal G. Adair, manager sales development department; A. H. Fagan, manager credit department; H. J. Quirk, field secretary, and Royal T. McKenna, general counsel.

Mr. Moynihan, a member for several years of the grading committee on manufacturers' accounts, told of the association's credit service, which keeps members informed on 2500 manufacturing and wholesaling accounts throughout the industry. He emphasized the importance of the monthly group credit meetings of non-competing manufacturers within the association, the gradings established by committees of members analyzing manufacturers' and jobbers' accounts, the card index file furnished all members summarizing more than 1500 wholesale accounts, and the system under which thousands of trade experiences reported by the 400 members are studied and disseminated.

General Manager Heminway described the work of the organization as a trade association, telling of its part in bringing about the reduction and final elimination of the excise tax on parts and accessories, promoting highway expansion, opposing destructive and encouraging constructive legislation and cooperating with other associations in the industry and in other industries for the benefit of the trade and the public.

Mr. Adair related plans for group meetings and researches to assist manufacturers of kindred parts in making and carrying out sales policies. Groups of makers of accessories, service parts and service equipment have already been formed, with committees of sales executives advising with Mr. Adair, and organization of an original equipment group or perhaps several of them may come later.

Unique Cooling System Incorporated in New Rail Car Design

Radiator placed in roof of combination passenger and baggage car built by Minneapolis Steel & Machinery Co. Six-cylinder 175 hp. engine is used with positive drive on all four axles.

A RAIL car using a specially designed, six-cylinder, 175 hp. engine; unique cooling system; a three part transmission unit incorporating reverse gears, change speed gear and differential; positive drive to all four axles, and automotive type air brakes has been developed by the Minneapolis Steel & Machinery Company. Passenger carrying capacity in the rail car is 36 and there is also a baggage compartment 10 ft. long. A trailer unit designed for use with the rail car has a capacity of 58 passengers.

A very complete description of this new rail car was given by A. W. Scarratt, mechanical engineer of the company, in a paper read before a recent meeting of the mid-west section of the S.A.E.

Then engine used is a specially designed six-cylinder job of 5¼ in. bore and 7¼ in. stroke and is capable of delivering 175 hp. at 1300 r.p.m. A four-bearing crankshaft of S.A.E. No. 1045 steel, heat treated to an elastic limit of 80,000 lb., is employed. All main bearings and crank pins are 3½ in. diameter, the shaft is machined all over, put in static and running balance before assembly, and is drilled for pressure lubrication to each crank pin.

The connecting rods are tubular and are made from S.A.E. No. 6130 chrome vanadium steel. They are machined and polished all over. Their Brinnell hardness after heat treatment is 320, which produces an elastic limit of 145,000 lb.

The pistons are of close-grained cast iron and have liberal sized heads and light skirts with annular ribs. Four rings, all above the wrist pin, seal the piston, and oil pumping is prevented by drainage below the bottom ring.

The cylinder construction consists of three twin blocks of close-grained cast iron, suitably water-jacketed and attached to the top of the crankcase. The cylinder heads are removable and each head has its independent group of valve operating mechanism concealed by a polished aluminum cover. The intake valves, of chrome nickel steel, are of larger diameter than the exhaust valves which are of Thompson Sil-chrome material.

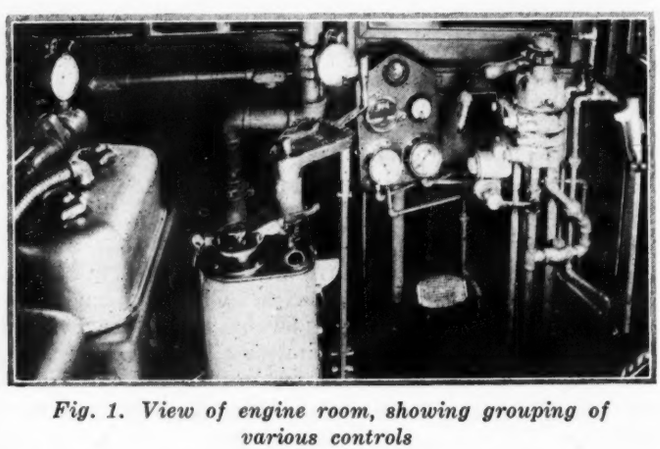


Fig. 1. View of engine room, showing grouping of various controls

In mounting the engine it is insulated from the steel frame of the car by interposing oil soaked wood bushings and liberal sized washers of insulating material between the engine and the frame structure. A simple timing gear train employing helical gears permits direct drive from crankshaft to camshaft and from camshaft to water-pump shaft.

The intake manifold is a straight trunk manifold with three branches, one to each cylinder head, and provides for the mounting of two carburetors. These are located equi-distant between the branches of the manifold and are attached to throttle valve chambers, the valves of which are controlled by a speed limiting governor. The exhaust manifold consists of three siamesed connector pipes joined by a trunk manifold to which a vertical exhaust pipe is flange connected.

Electric or Hand Starting

A flywheel incorporating a ring gear for electric starting and a ratchet for hand starting is secured to the end of the crankshaft and is designed to receive a special three plate spring operated clutch.

The camshaft, a one-piece carburized chrome nickel steel forging located to the right of the longitudinal centerline of the engine, actuates mushroom tappets through vertical pushrods. A double, sliding vane oil pump is driven from the camshaft through spiral gearing, the oil being delivered to a receiving tank and filter mounted on the engine room partition. The pump delivers oil at 30 lb. pressure to every vital part of the engine.

Dual and double ignition are used; that is, either battery or magneto are available to furnish current supply —only one spark plug being used per cylinder when running on battery. Two plugs are used in each cylinder and when high tension magneto current is being used both plugs ignite the charge simultaneously.

The magneto is a two-spark, dual, Robert Bosch Model Z-6 high tension; a large Putnam storage battery supplies current for starting and is charged by a 32-volt train lighting generator. The starting motor is a Leece-Neville fitted with Bendix gear.

The cooling system used is unique. A water storage tank of large capacity is mounted on the roof of the car and is connected to a radiator suspended in an open well hole in the roof and in a slightly inclined position. The radiator is of the flat tube and fin type and is divided

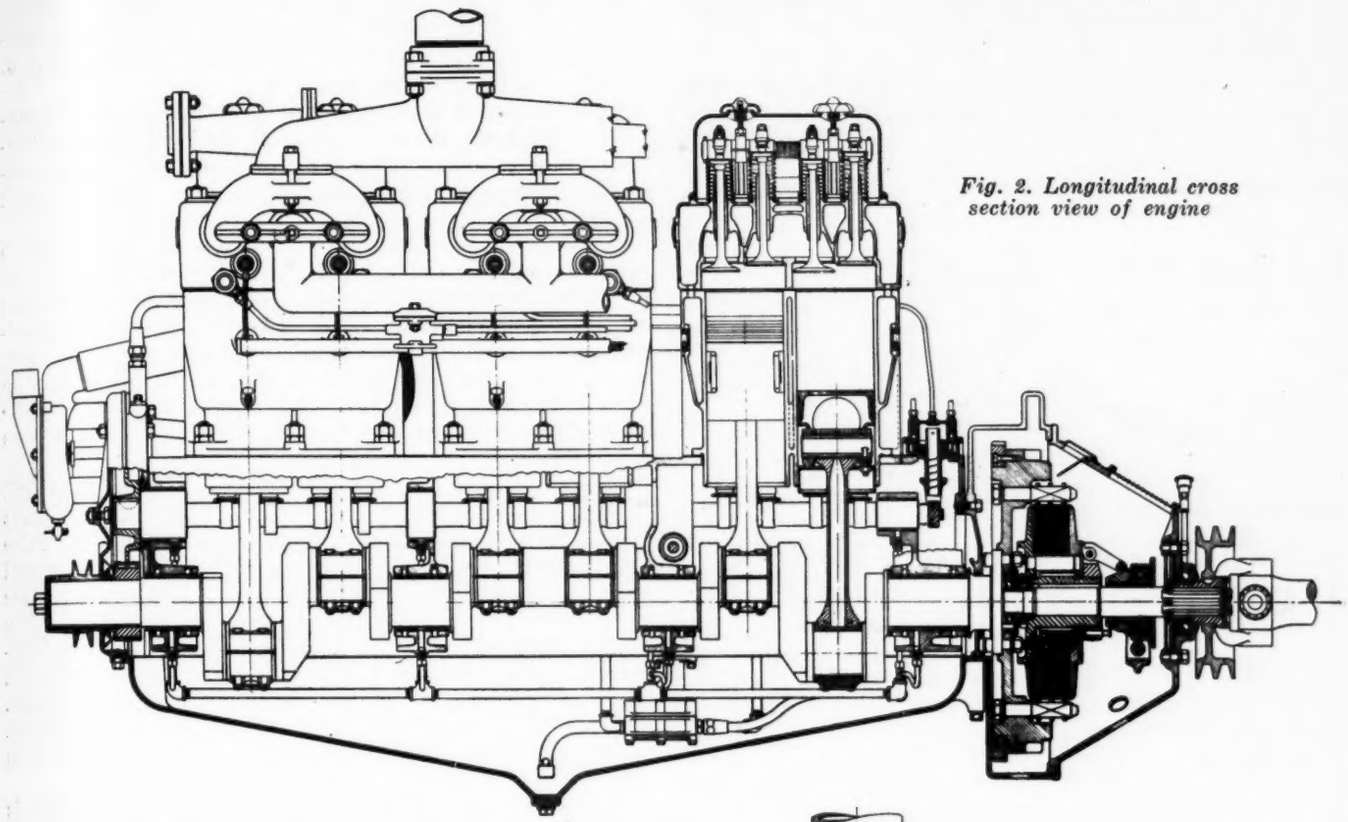


Fig. 2. Longitudinal cross section view of engine

into two sections thereby permitting the drive shaft of the cooling fan to pass between them. Upon leaving the radiator the water flows to the water pump at the forward end of the engine whence it is delivered to the engine jackets, heated and returned to the storage tank.

There is a branch from the bottom of each cylinder block which is connected with a Perfection kerosene water heater. When the water has been cooled by passage through the cylinder blocks during times when the engine is not in operation it flows to the heater, passes up through the copper coils enclosed in it and then into the storage tank, whence it flows by gravity into the radiator and back into the water pump. In this way a constant thermosyphonic action is maintained during stand-by periods which prevents freezing.

Dampers Control Air Flow

To provide air supply for cooling the water in the radiator two ducts are built into the car and connected with the under side of the well hole in which the radiator core is supported. Each flue is provided with a damper by means of which flow of air can be controlled at will. The fan operates in a horizontal plane, is 30 in. in diameter and is rotated at engine speed—1300 r.p.m.—by means of a small transmission unit located above the bell housing of the engine.

A special three-plate, dry disk, lever type, spring engaged clutch was designed for the rail car. To facilitate shifting of gears a clutch brake arm is mounted on the main drive shaft running from the clutch to the transmission. This brake operates in unison with the clutch and enables the gears to be shifted quickly and easily. The clutch is provided with holes at both top and bottom for ventilation and violent circulation of air is induced by the ratchet teeth at the periphery of the flywheel.

The transmission is constructed in three units all of which are joined together into one assembly. It provides four speeds forward and reverse and for the transfer of

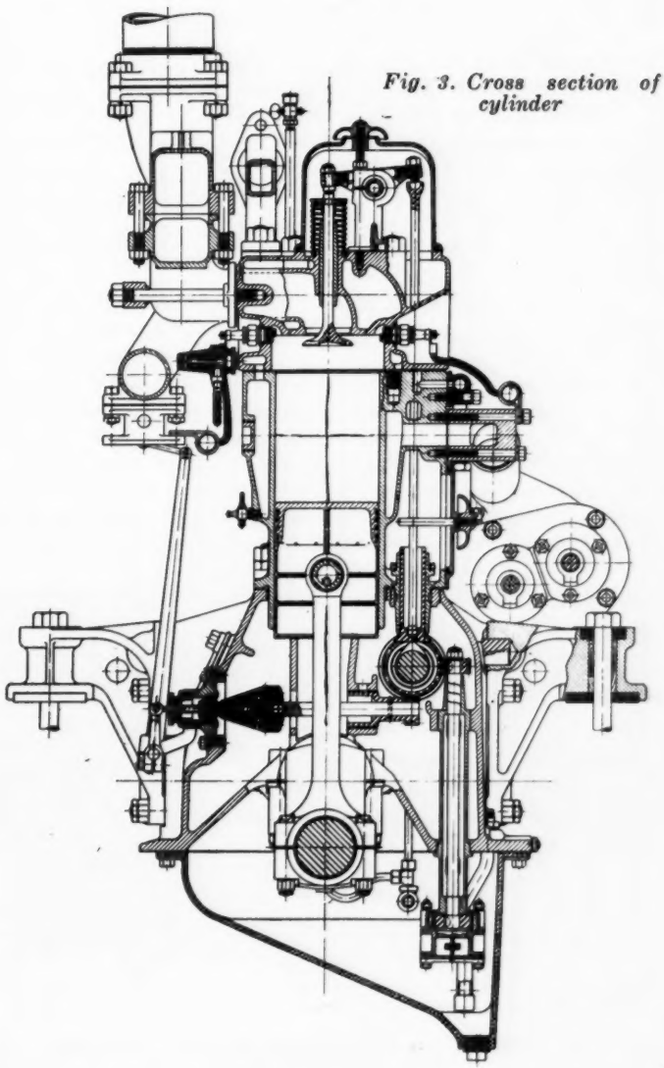


Fig. 3. Cross section of cylinder

energy to both trucks under the car. The drive shaft from the clutch connects with the reverse gear compartment by means of which the driving torque may be delivered to the adjacent change speed gear box in either direction. A reverse gear lever and quadrant at the left of the driver's position controls gear shifting mechanism.

The four speed gear compartment is conventional in arrangement and the selection of the proper gear ratio

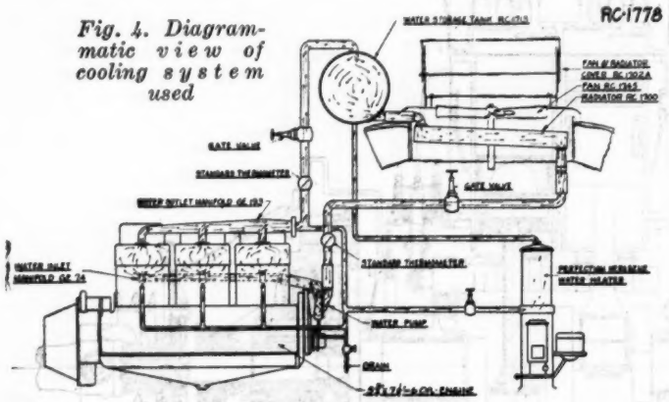


Fig. 4. Diagrammatic view of cooling system used

is taken care of by the gear shift lever and quadrant located at the right of the driver. From the change speed gear box the energy is delivered to a transfer and compensating gear chamber. It is necessary to drive fore and aft from this chamber and also to compensate for drive wheel slippage or for a difference in drive wheel diameter between two trucks. To accomplish this a differential of unusual design is used from which the power is delivered through drive shafts running forward and back to the two trucks of the car.

The transmission is provided with three point suspension and is insulated from the frame of the car in the same manner as is used for the engine, described before. The transmission case is in three sections, interlocking to secure correct alignment, and is made of semi-steel. Each section is separately lubricated.

The drive units mounted on the rear axle of the forward truck and on the forward axle of the rear truck are of the double reduction spur and bevel gear type. Driving energy is delivered to a short countershaft above the truck axle on which is mounted a spur pinion which meshes with a gear located on a longitudinally mounted shaft intersecting the axis of the axle at right angle. On this shaft is also mounted a bevel gear which meshes with a similar gear mounted on the truck axle. All of this mechanism is supported by anti-friction bearings

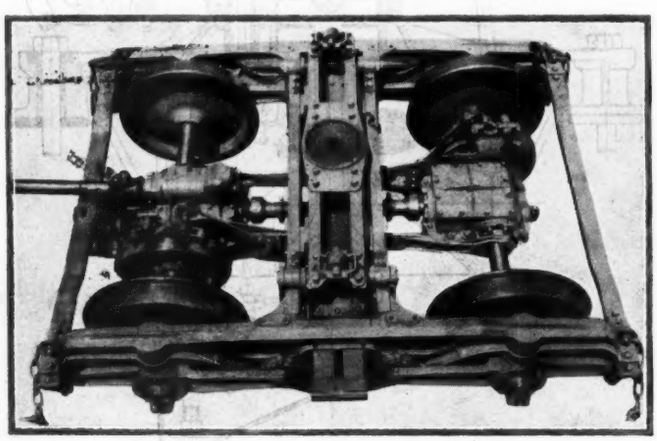


Fig. 5. View of one of the trucks, showing automobile type brakes

of the ball and roller type and is contained within a semi-steel casing which, in turn, has a floating suspension on the axle of the truck through the medium of tapered roller bearings.

The two drive gear units in each truck are interconnected by means of gear type jaw clutches and an intermediate drive shaft which passes under the main transom frame channels and the spring mounted truck bolster.

A two-part main drive shaft delivers the engine torque from the rear end of the clutch shaft to the forward end of the main transmission unit. This shaft lies at a slight angle and is provided with a universal joint and supporting ball bearing to reduce the length of the drive shaft units. The propeller shaft brake mentioned before in connection with the clutch description acts on a brake drum 10½ in. ahead of the intermediate joint of this drive shaft.

From the rear compartment of the transmission unit the drive is carried to the double reduction gear units on the two trucks by means of similar two-part drive shafts, each provided with an intermediate universal joint and supporting ball bearings. These shafts are connected at their outer ends to the counter shafts of the double reduction gear units by means of slip type universal joints, and are connected to the transmission at their inner ends by means of gear type jaw clutches. As previously mentioned, the two axle gear units of each truck are interconnected by means of driving shafts with gear type jaw clutches at each end.

From the above it is evident that a positive drive is delivered to each of the four axles of the two car trucks, and that the drive between the trucks is compensated through the differential located in the rear compartment of the transmission. Because of this four-axle drive arrangement it is claimed that it is almost impossible to slip the wheels under starting torque due to bad rail conditions and that the car is able to exert its maximum tractive effort under all conditions.

Automotive Air Brake

The brake layout is of the automotive type and consists of a two-shoe clasp brake lined with asbestos lining operating on semi-steel cast drum, chilled and ground to a high polish on the outer surface, and which are mounted on the truck axles. The two brakes of each truck are operated in unison by a common pull rod from the foundation brake rigging which is connected to an equalizer bar at the inner end of each truck. The brake actuating mechanism is Westinghouse A.M.M. type.

The rail car is divided into three sections, an engine room, a baggage room and space for passengers. Overall width is 9 ft. 2 in., roof height above the rails is 12 ft. 7 in. and coupled length is about 53 ft. Light weight of the car is 65,000 lb. Steel construction is used almost entirely. Careful consideration has been given to the entire design to make it pleasing in appearance within and without and to provide all the equipment and accessories that are desirable in such a transportation unit.

At the driver's left is a control staff containing the engine throttle lever, spark control lever, starter switch, pneumatic starter lever, and ignition control. On the control panel are grouped the oil pressure gage, ammeter, speedometer and two pressure gages for the air brake system, all of which are lighted by an electric dash light. There are also two illuminated thermometers for indication of water temperatures entering and leaving the engine.

To the right of the driver is located the air brake valve and the gear shift lever and quadrant.

Just Among Ourselves

How Times Do Change!

THE changed attitude of industrial executives toward wage problems and questions of industrial relationship, as evidenced at the U. S. Chamber of Commerce meeting, was outlined in our columns last week. One specific point on which there has been a marked change has been in the attitude as regards high wages. At one time an employer who had advocated keeping wages at the highest level possible and cutting wages only when all other expedients for reducing costs had been exhausted would have been considered a lunatic. Today applause and approval greets the statement that high wages are desirable, because the higher purchasing power brought about by higher wages is being more fully recognized as is the actual cost reductions which accrue from workers reasonably well satisfied with their rate of pay.

* * *

Automotive Industry Falls Into a Sound Idea

IT'S interesting to note that the automotive industry stumbled on the efficiency value of high wages early in its devlopment and has continued paying relatively high scales ever since. This came about, not because automotive men had any better vision of the fundamental economics of the situation than did other industrial leaders, but because the excess of demand over supply in this new and growing field made it possible for individual companies to pay high rates without adverse effects, whether a major portion of all industry did so or not. Obviously, a particular company might pay high wages without increasing the purchasing power for its own products sufficiently to make any difference to its market, because 99.99 per cent of the products of any factory are bought by workers in other organizations. The automotive industry could afford to outbid other industry for men and it did it. Then having done so the efficacy of paying a little more and getting a good bit more became apparent. To continue in line with current progressive trends as regards wage payments, the automotive industry needs only to continue, fundamentally, along the lines which it has almost always pursued. Better reasons for the policy now are available to the average executive than he ever had before; rationalizing, in this case, seems to be a perfectly proper process.

* * *

Does Thrift Cause Business Depressions?

WHICH reminds us that if you haven't read the article called "The Dilemma of Thrift," published in the Atlantic Monthy of April, 1926, you should do so without fail if you have any interest whatever in this question of wages as related to buying power. Briefly, the article sets out to prove that, while thrift is profitable and necessary to the individual, it is the cause of our waves of depression in industry and business, because money saved by individuals and corporations goes back into the production of more goods, when sufficient money to purchase the goods already produced is not available. This is an inadequate statement of a well-reasoned, logical thesis propounded in this article, which, by the way, is written in such simple language that a schoolboy could not fail to follow its meaning. And there's a prize being offered for the best adverse answer to it. We rise to doubt that the prize winning answer would beat the original article if opposed to it in debate—which is hasty judgment, of course, since the answer hasn't even been written yet, let alone selected. Anyhow, the article is one of great significance to any automotive executive concerned with wages, purchasing power or industrial management.

* * *

Opening Garage Doors with the Headlights

DRIVER comfort certainly is improving every day. In the future, it seems, we won't even have to toot our horns to let the garageman know that a customer waits without. All that will be necessary is to flash the light on the garage door, which will be equipped with an electrical device that will react to the rays of the headlights in such a way as to make the doors roll open. Such a device, operating it is said on the principle used in making radio photographs, was exhibited at the National Electric Light Association meeting recently. With all these comforts with which modern science provides us, it is remarkable that somebody doesn't do something about Pullman car windows.

* * *

Speaking of Mules, Some Drivers are as Stubborn

A CITY councilman down in Atlanta has introduced an ordinance prohibiting horses, mules and other miscellaneous beasts of burden from being left unhitched in the streets. Seems like a good idea. Coming to work this morning we saw a horse-drawn milk wagon stretched out across three-quarters of a street, thus leaving only a single lane for traffic which was fairly brisk. Animal-drawn vehicles are not the only ones which wander out of their proper places. Driving on the left hand side of the street, parking in the middle of a traffic lane and similar Gopher Prairie tricks still are all too prevalent in the outlying urban districts of some of our large metropolitan centers.

—N. G. S.

Drive Shafts *and* Bearings *are* Chief *Supercharger* Design Problems

Parts for centrifugal compressor type must be proportioned to give adequate factor of safety without being too heavy. Anti-friction bearings sometimes wear longer when run dry.

By David Gregg

TWO types of compressor are now in general use as superchargers—positive compressors such as the Roots blower, and centrifugal compressors.

The positive compressor is a displacement pump taking in a certain volume at its intake, and discharging it into a smaller volume, the pressure depending on the ratio of the two volumes, the leakage past the compressor elements, and the efficiency. Of the positive type compressors, the Roots has been most widely used as an automobile supercharger, and a comparison of it with the centrifugal type is of interest.

The Roots blower is really a two-toothed gear pump, consisting of two figure-8 impellers driven together by a set of gears. The delivery pressure to a large extent is independent of speed, but varies widely with changes in volume. Regulation is obtained by throttling the intake, or, if the carburetor is at the intake, its throttle will also regulate the amount of supercharging.

A relief valve is necessary to protect against backfire, as there is no free passage through the blower as in the centrifugal type. The impellers are fitted into a casing with close clearances between all parts. The gears that rotate the impellers must be accurately made, and have very little backlash, and one impeller must be carefully located with respect to the tooth spacing of the gears, so that when they are in mesh the impellers will have the correct clearance between them. Even with this precaution the impellers are apt to rub at high speeds, so it is the usual practice to supply them with a small amount of lubricant. Manufacturing difficulties and the necessity for accurate construction have limited the use of this type of compressor as a supercharger, although it has a well defined application due to its ability to give full supercharging at low car speeds.

In a centrifugal supercharger pressure is built up from the energy imparted to the air by a rapidly revolving fan or impeller. Air is drawn in at the center of the impeller and is flung outward by centrifugal force, being compressed in the process. It leaves the impeller with approximately tip velocity, which frequently runs over one thousand feet per second. The high velocity is reduced by passage through suitably proportioned areas with an additional gain in pressure. Roughly, the delivery pressure of a centrifugal supercharger depends on the square of the tip speed of the impeller, while the volume is a function of the blade width and area of the passages.

Structurally the centrifugal supercharger is simple and very compact. Aside from the gear drive the impeller is the only moving part. It revolves in a casing with several thousandths of an inch clearance on each side, there is no rubbing, and no lubrication is required. As the most restricted area in the compressor is as large as the carburetor venturi, there is no need of valves or other devices to prevent damage in case of backfire. Due to good efficiency and high speed the size required for an automobile supercharger is small. For example, a supercharger for a 61 cu. in. displacement racing engine delivers 100 cu. ft. of air per minute at a pressure of 4 lb. p. s. in. above atmospheric. Its total weight, including gear drive, is only 10 lb. and the overall diameter 8 in. In production the impeller and casings can be die cast with practically no finishing machine work except reaming the bore of the impeller.

Characteristic Curve

Fig. 1 shows a typical characteristic curve of a centrifugal supercharger taken at constant impeller speed, with pounds of air plotted against pressure ratio. A glance at this curve shows that the volume may be varied widely with only a small change in the delivery pressure, a most important feature of this type compressor, as it permits instant acceleration, for the weight of air delivered to the engine increases as soon as the throttle is opened. There is no lag waiting for the pistons to suck in additional charge. The high air velocity, and rotational speed of the impeller cause a thorough vaporization of the fuel mixture with resulting improvement in operation, and freedom from all troubles due to raw fuel getting into the cylinders.

This mechanical fuel mixing, together with the heat of compression, permits more thorough utilization of the fuel, the resulting mixture, being free from liquid fuel in suspension, is evenly distributed to the various cylinders, burns freely, and leaves little carbon deposit.

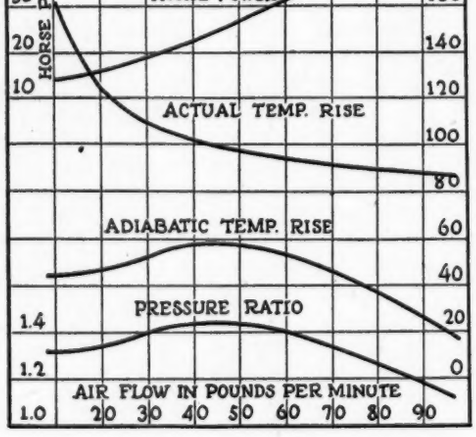


Fig. 1. Characteristics of centrifugal supercharger

When designs of gear-driven centrifugal superchargers were first made there was some doubt as to the ability of a gear train to operate continuously at speeds above 20,000 r.p.m. After the first few tests several factors became evident. That the gears gave no trouble whatsoever; that anti-friction bearings required special attention in order to operate successfully at high speeds, and that high speed drive shafts frequently failed for no apparent reason. These problems are considered here one by one.

Herringbone Gears First Used

Herringbone gears were first used, of case hardened nickel steel. The pinion was self centering, the bearings floating in hardened and ground steel cages. Straight 14/16 stub tooths gears were used next, case hardened and ground. A 2 in. face was used to transmit 56 hp. at 23,000 r.p.m. on a 13 to 1 gear ratio.

In operation this set of gears transmitted as high as 100 hp. without appreciable signs of wear. Various ratios ranging from 6 to 1 to 13 to 1 were used, and all operated satisfactorily. The least number of teeth used on the pinion was eleven.

A set of rejected gears with 0.030 in. back-lash, and in which the grinding cut through the case hardening, operated with but little more noise and wear than the highest grade gears. After 100 hr. operations at 23,000 r.p.m., a case hardened pinion showed no signs of wear, while a similar soft pinion was somewhat battered and pitted. The gears were lubricated by a fine stream of oil directed against the trailing edge of the pinion, which spattered the oil in a fine mist throughout the gear case. On small centrifugal superchargers used on dirt track racing cars, the gear case is filled with fresh oil at the start of each race, which provides all the necessary lubrication.

Of the various gear arrangements for a supercharger drive the single reduction, straight spur gear drive is undoubtedly the simplest and most reliable. Such a drive is shown in Fig. 2.

A double reduction drive, with three sets of gears meshing on one pinion, proved a complete failure as it was impossible to make the gears divide the load evenly. As a result, first one and then another of the triple bearings would be overloaded and burn out. A planetary drive used on the Duesenberg superchargers proved very satisfactory, quiet, and compact.

A number of drives have incorporated slipping clutches to reduce acceleration loads, and to smooth out the drive, the latter being the more important. Perhaps the most interesting of these is an oil clutch designed by H. E. Morton, of the B. F. Sturtevant Co., and shown in Fig. 3. The pistons of a five-cylinder oil pump are actuated by shoes sliding in a ring eccentric to the gear center. Oil is drawn into the pump, and discharged through a variable orifice, which regulates the pressure against the pistons, and hence the torque available to drive the main gear. At full load the orifice is closed, making a locked drive. A small amount of air is bled in with the oil to provide a cushioning effect.

Multiple disk clutches, steel against bronze, flooded with oil, were used in a supercharger for an aircraft engine that had a light and flexible crankshaft in which there was excessive whip. The loads and inertia of a supercharger suitable for most automobile engines are so relatively light that there is no apparent need for a slipping clutch provided the engine is not raced without load.

High-speed drive shaft failures have occurred from time to time in airplane superchargers, and are probably caused by fatigue failure. With a supercharger shaft turning at 30,000 r.p.m., two reversals of stress a revolution would be 3,600,000 an hour, so if the material was operating near its elastic limit failure might only be a question of a few hours running. In airplane superchargers failures of this nature have been greatly reduced by providing ample fillets, large shafts, high grade alloy steels, and careful heat treatment. The same care in design and selection of materials for automobile superchargers should provide an ample factor of safety, with resulting freedom from these troubles.

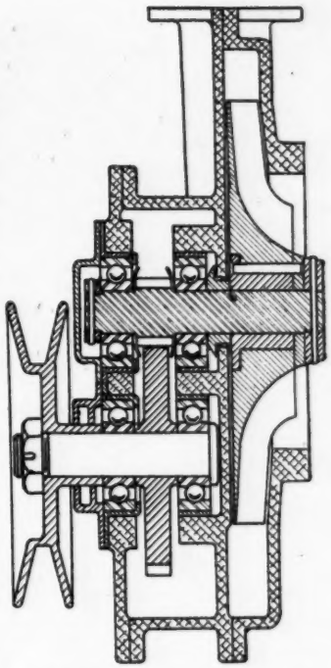


Fig. 2. Sectional view of centrifugal supercharger for passenger cars

Anti-friction bearings are used almost exclusively to support the supercharger impeller and drive shafts. Lubrication, or rather lack of it, is most important. Drops of oil entering the bearings at high speed are like so much sand in the races, the balls must spread the oil, and squeeze out the excess amount, placing an additional load on the races and cages.

In one particular supercharger the pinion revolves at 23,000 r.p.m. and transmits 56 hp. It is supported by two paired sets of open bearings of 20 mm. bore. Various grades and amounts of oil were tested, but these bearings failed regularly. By gradually cutting down the amount of oil the life of the bearings increased, until with dry bearings 200 hours operation was secured at 32,000 r.p.m., a total of 384,000,000 revolutions without apparent wear. This is comparable to an automobile

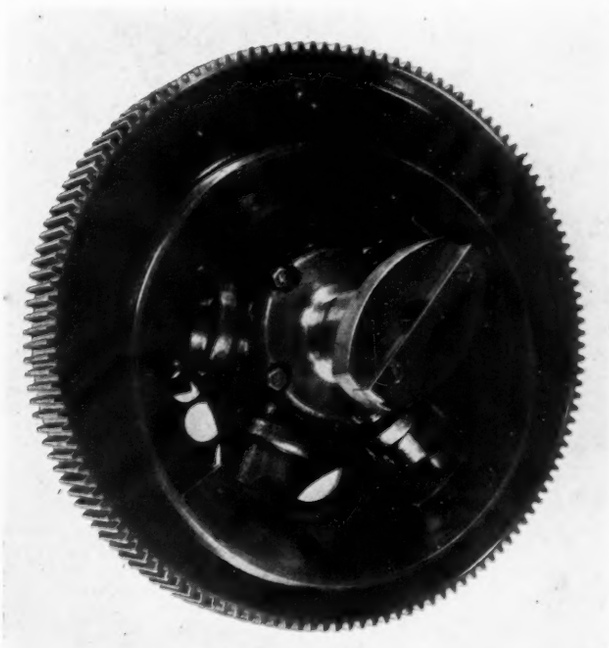


Fig. 3. Oil clutch used in Sturtevant gear-driven supercharger

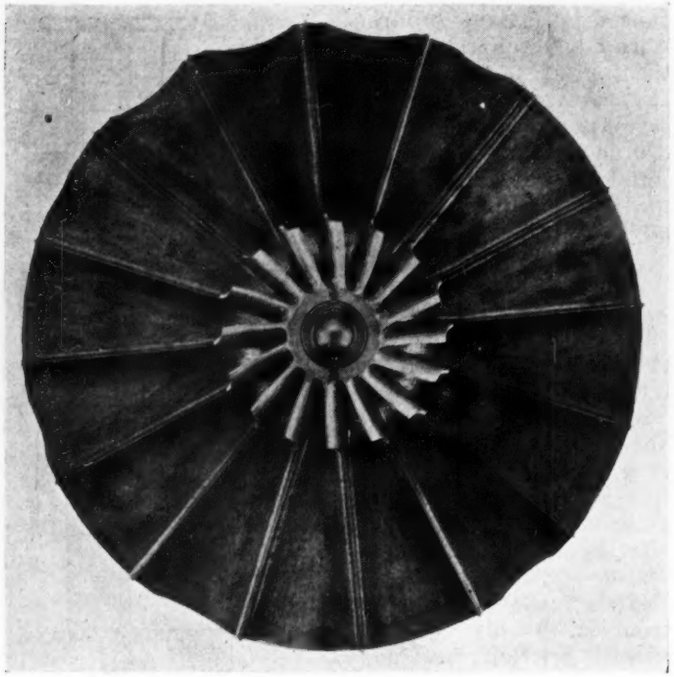


Fig. 4. Original steel impeller used on centrifugal supercharger. (The unevenness at the tips is where material was filed off for balancing)

wheel running 600,000 miles without replacing or adjusting the bearings.

The desired characteristics of ball bearings for supercharger use are concentricity, perfect fit, and a light weight cage, preferably of brass or bronze. In mounting the bearings steel bushings are always used in aluminum housings. The inner races should be locked to the shaft. When two ball bearings are used to support the pinion shaft one outer race is locked to position the shaft, the other outer race floats in a hardened and ground steel bushing. This free bearing may be replaced by a roller bearing with the outer race locked, as end play is taken

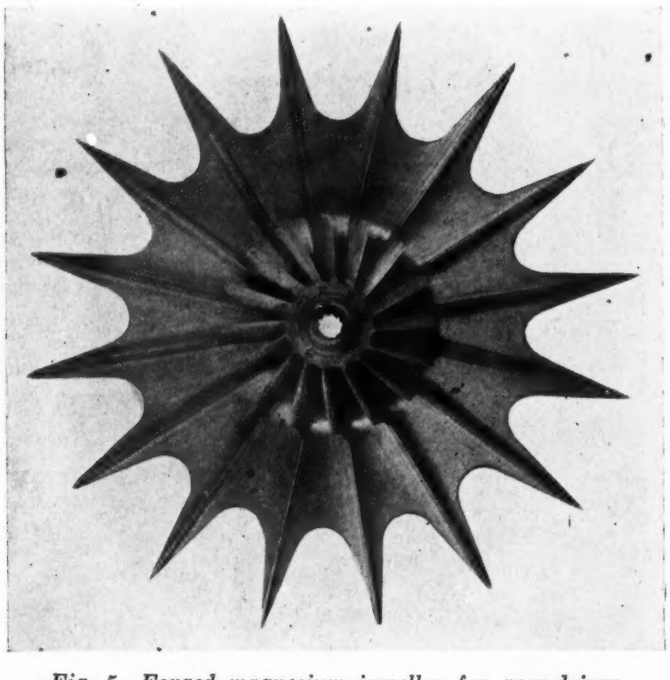


Fig. 5. Forged magnesium impeller for gear-driven supercharger, scalloped to reduce the moment of inertia

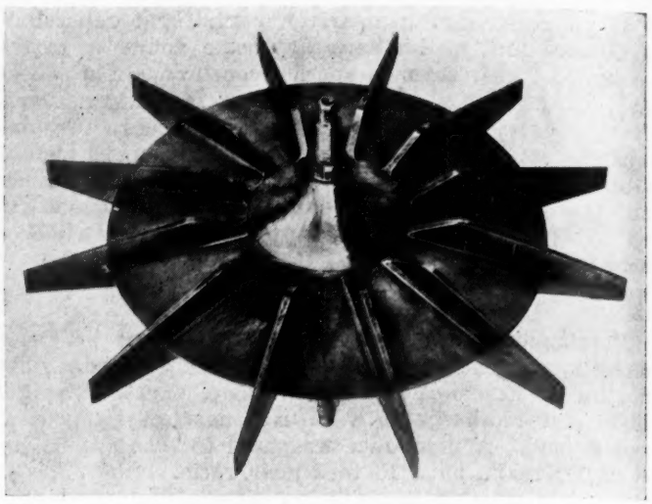


Fig. 6. Forged alloy steel impeller for supercharger with radial inlet. Its high moment of inertia calls for the use of a slipping clutch, and a Sturtevant oil clutch was used

care of by the movement of the rollers over the flat race. The Hoffmann is the only type of roller bearing that so far has proved suitable for extremely high speeds. If there is much end thrust a separate ball bearing should be used, and the cage relieved, so that this bearing carries no radial load. The low speed bearings follow standard practice, and offer no problems.

The nuts that hold the inner races to the shaft must be carefully locked. On one particular airplane supercharger some phenomena of vibration or twisting at high speed caused practically every standard type of locking device to fail, and the nuts were only secured by drilling through both nut and shaft, and riveting them together. Fortunately such drastic measures are not necessary in automobile superchargers, but proper locking should not be neglected.

Considering the supercharger and drive as a unit, the factors that determine the maximum load are the engine acceleration and the moment of inertia of the supercharger rotating parts. By far the greater part of the rotating energy is contained in the impeller, due to its diameter, and very high speed. To secure a given pressure a certain tip speed is indicated, which, for example, may be obtained by a 12-in. impeller rotating at 10,000 r.p.m. or by a 6-in impeller rotating at 20,000 r.p.m. The force necessary to accelerate the impeller to the required tip speed in a unit time is

$$\text{Force} = \text{constant} \times \text{weight} \times \text{r.p.m.} \times K^2$$

where K = the radius of gyration. The 12-in. impeller will weigh approximately 8 times as much as the smaller impeller, as its surface will be 4 times as large, and its thickness must be doubled to keep the same proportions. The square of the radius of gyration is 4 times as great, while the r.p.m. is half as great. Roughly, therefore, the force required to accelerate the large impeller will be 16 times that to accelerate the small one, hence the obvious reason for the speed at which direct connected centrifugal superchargers operate.

The design of the compressor itself may be divided into three parts—the inlet, the impeller, and the diffuser and collector ring. Practically all centrifugal superchargers have an axial inlet, that is, the fluid enters the impeller parallel to the shaft. On some designs entrance buckets, a series of curved blades rotating with the impeller, change the direction of flow from axial to radial without appreciable loss of energy. Fixed entrance

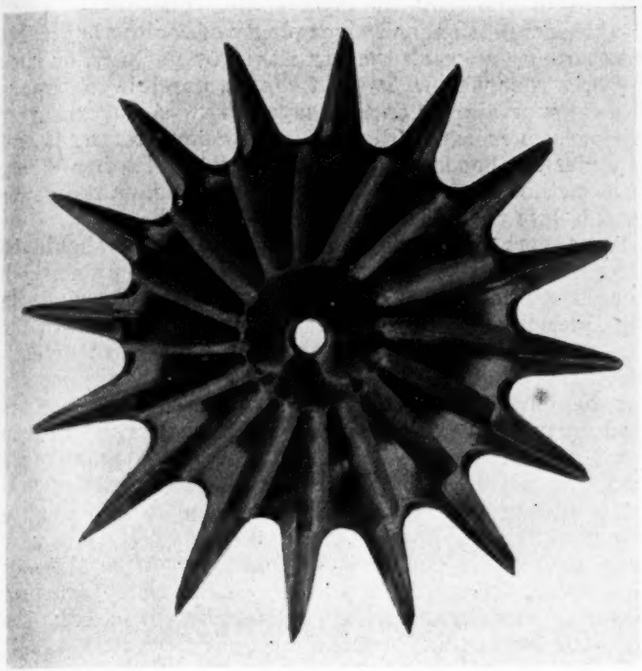


Fig. 7. Small high speed impeller of forged magnesium. Axial, single entrance type

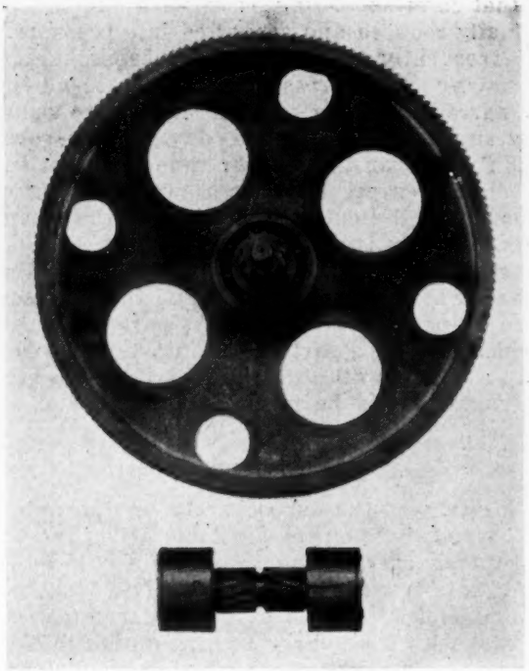


Fig. 8. Herringbone gear drive of 2 in. face, transmitting over 100 hp. at 2400 r.p.m.

buckets accomplish almost the same results, and are somewhat simpler. A design without any provision to avoid inlet shock is somewhat less efficient than designs with entrance buckets, but the loss of efficiency goes into greater turbulence and mixing of fuel and air so that it is not an unmitigated loss. The Sturtevant impeller illustrates a radiant inlet type, the curved central web of the impeller changing the direction of air flow from axial to radial.

Impeller Most Expensive Part

The impeller is the most important and most expensive part of a supercharger at the present time. Due to its diameter and high speed it contains the greater part of the rotating energy in the supercharger, hence every effort is made to reduce its weight and inertia. Impellers for turbo-superchargers were originally made of steel, as inertia was of little importance. When the impeller was driven direct from the engine by high ratio gearing inertia became of first importance. The air load on the impeller is light, most of the stress being caused by centrifugal force. As a result, the factor of safety depends largely on the strength-weight ratio of the material used, and in this respect forged duralumin or forged magnesium compare favorably with some grades of steel. Impellers made from these light-weight alloys have given excellent results, with a great saving in weight and inertia. In addition, the web between the blades has been deeply scalloped, with an additional gain.

The methods of fastening the impeller to the shaft is important. Due to centrifugal stress the bore expands at speed so that the impeller must be pressed on to the shaft with a forced fit greater than the amount of the expansion. If the impeller does not have to be removed from the shaft this is a simple process, but almost all gear-driven superchargers require a removable impeller. In order to keep a removable impeller tight on the shaft at speed a steel bushing is pressed into the impeller with a force fit greater than the centrifugal expansion of the bore. The hole in the bushing is made a snug fit on the impeller shaft, and either keyed or splined to the shaft. At speed the steel bushing remains tight on the shaft while the expansion takes place between the bushing and the impeller. The final machining of the impeller is done after the bushing has been fitted so that the impeller will track properly when mounted on the shaft. Before assembly the impeller is balanced both statically and dynamically.

The problem of diffusion is to reduce the air velocity as rapidly as possible without turbulence, and with a minimum amount of skin friction and eddy losses.

Three general types of diffuser are in common use. One consists of a series of vanes surrounding the im-

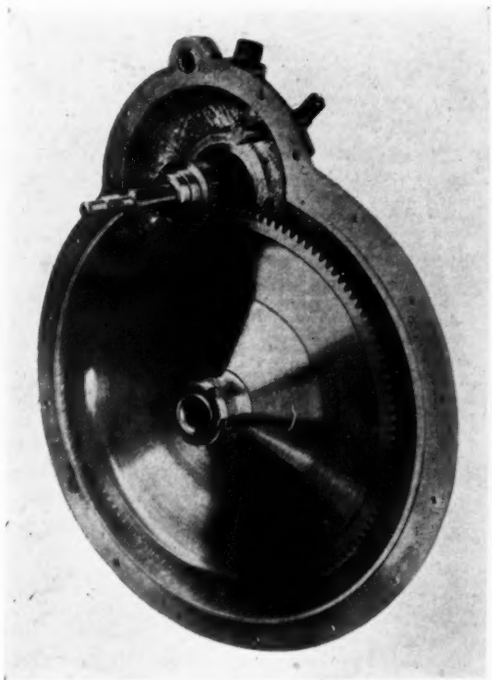


Fig. 9. Gear drive for supercharged induction system transmitting 17 hp. Note splined impeller shaft and roller bearing

peller that form expanding passages where the velocity is gradually reduced and converted into pressure. This type is frequently used in airplane superchargers and others having a high pressure ratio. A second type has a very narrow diffusing section designed to reduce the velocity smoothly and without eddy. Its characteristic curve is flatter than the diffuser vane type that is, there is less change in pressure for a corresponding change in volume, but the outside diameter of the compressor is increased. The third type, one that makes a particularly compact installation, is a volute passage that collects the air at constant velocity, and then increases its pressure by passing it through a separate diffuser passage which may be a part of the intake manifold to the engine. As all air velocities in superchargers are high, the passages should be machined smooth and scraped or polished.

Location is Important

The location of the supercharger on the automobile engine depends both on the available drive, and the size of the supercharger. The compressor should be located so that it is in free air in order to radiate away as much heat as possible. This is of particular importance in racing cars with superchargers giving high intake pressures, as the air temperature without adequate cooling may easily rise above 200 deg. Fahr.

The first supercharger used on a car winning the Indianapolis race, that designed by the writer for the Duesenberg cars in 1924, was placed at the side of the engine so that it was exposed to the rush of air past the hood, and was kept so cool that there was no detonation in spite of the high intake pressure and the compression ratio of the engine.

The superchargers used on the Miller cars in 1925 are a particularly compact and clean installation, but lack the advantage of adequate cooling, as the compressor is flush against the partition between the engine compartment and the driver's seat.

Superchargers used on dirt track racing cars, such as rebuilt Fords, are placed directly in front of the radiator and are driven from the crankshaft. This makes a get-at-able installation, and gives plenty of cooling but makes it necessary to crank the car either by pushing, or jacking up a rear wheel. It is, of course, possible to arrange a bevel gear starter on the drive shaft. A supercharger for passenger cars (Fig. 2) is so compact that it will fit under the hood, and is driven by a link leather V belt. This method of drive is quiet and reliable, as the power used is less than that of the radiator fan.

Some sort of flexible or fabric coupling should be placed between the supercharger and the engine, both to secure quietness of operation, and a smooth drive. In the Duesenberg car a drive shaft passing between the two sets of four cylinders provides a measure of elasticity that reduces the acceleration loads, and smooths out the drive from the engine. Two fabric couplings are used on the drive shaft of the superchargers mounted in front of the radiator on dirt track racers, providing a soft, non-metallic drive. There are many types of flexible coupling on the market, but as a rule they are too heavy and bulky for supercharger use. A very good coupling that is compact and light weight is the hair pin spring drive, which provides a removable coupling, allows for misalignment, and makes a smooth drive. The V belt drive is itself a flexible coupling.

Summing up, then, the centrifugal supercharger is simple, compact, of good efficiency, and will deliver a widely varying volume with but small changes in delivery pressure. These are the features that make it of prime interest to the automotive industry as a supercharger for automobile engines.

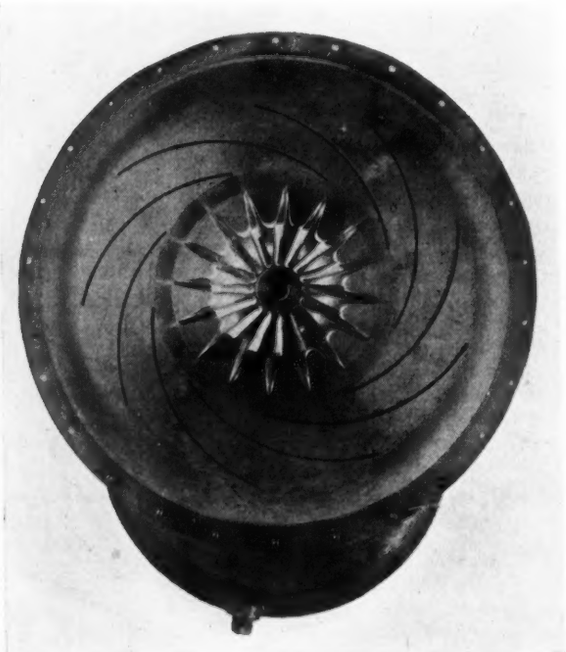


Fig. 10. Impeller in its housing, showing diffuser vanes that reduce the velocity of the air as it leaves the impeller, and produce additional pressure

French Cabriolets

FROM a recent article by Gabriel Voisin it appears that in France the demand for different body types varies greatly with weather conditions. The Voisin firm had three open cars (torpedos) in its Paris salesroom for a period of eight months without even the shadow of a possible purchaser coming into view. Then, during the Spring of 1925, there came a three weeks' spell of heat and draught which seemed to convince some twenty prospects that it wasn't "goin' to rain no mo'," for the three torpedos suddenly disappeared on the eve of a holiday, being sold to intermediaries who disposed of them at a handsome profit.

"This uncertainty concerning any production program has given rise in France to a type of vehicle known as a cabriolet," says Mr. Voisin. "Theoretically these vehicles can be used either open or closed, at the will of the operator, but the reality is less brilliant. The vehicles in question, conceived with an ingenuity which makes the less mechanical of our engineers shudder, were never quite capable of serving either as open cars or as closed cars.

"We have seen about a thousand of these curious vehicles pass through out shops, but we have never found among our customers a serious-minded man who would pretend that he opened and closed his vehicle, successively, as one opens his overcoat or his vest when it becomes *hot*. As a rule, the contraption, when it is closed, whistles, squeaks and creaks—in one word, it tires the operator after several hours' driving.

"The center of gravity being always too high, the vehicle is hard to handle, unsafe at turns and fatally dangerous in case of a blow-out. If the car is driven open, after a few miles over rough roads at moderate speed it is necessary to return it to the body builder, who must renew the cut leathers and replace the torn linings, and the owner suffers all the inconvenience consequent upon this procedure."

Bird's-eye view of the Sesqui-Centennial site in Philadelphia. The entrance to the grounds is designated by the arrow. The black cross in foreground marks the site of the Palace of Machinery, Mines, Metallurgy and Transportation, of which the Automobile Palace was to have been a part. The huge stadium is seen at the right of the picture and in the distance are the Palace of Agriculture and Pure Foods, Palace of Liberal Arts and Manufactures and the Auditorium. This view was taken early in April

Plans Dropped for *Automobile Palace* at Sesqui-Centennial

Exposition officials modify program for automotive exhibits but say they are still prepared to erect a special building provided enough manufacturers to take space can be found.

By Robert L. Cusick

INDICATIONS are that Philadelphia's big $24,000,000 Sesqui-Centennial International Exposition, which opens next Monday, May 31, and continues to December 1, will pass into history without most of the automotive features originally planned for it. Automotive manufacturers thus far have shown little or no inclination to participate as exhibitors. Ten days before the opening date, exposition officials stated that none of the passenger car, truck, bus or tractor companies had arranged for display space.

When it became evident a few days ago that the automobile manufacturers were not coming in as it had been expected they would, the exposition officials called a conference and eliminated from their building plans that portion of the Palace of Machinery, Mines, Metallurgy and Transportation which was to have been known as the Automobile Palace. This was down on paper as a 175 by 660 ft. wing and was to cost $290,000.

It should probably be stated here that all construction work in connection with the vast enterprise will not be completed by the opening date. The exposition is not likely to be running full blast before July 1, or even later. The Palace of Machinery, Mines, Metallurgy and Transportation, for instance, will not be ready for occupancy before about June 25. Ground is just being broken for some of the smaller buildings.

In view of this situation it is not too late yet to put up a temple for automobile exhibits, according to W. E. MacFarland, chief of the Palace of Liberal Arts and Manufactures, who has been in charge of the automotive program, and the efforts to interest car manufacturers will be continued.

"Our original plans for an Automobile Palace have been abandoned," said Mr. MacFarland, "but we haven't yet given up all hope of having this gigantic industry represented at the exposition. In the event that some of the manufacturers can be induced to put in exhibits, we will immediately draw up plans for another building. We have a site reserved for this purpose and $80,000 is available to defray the construction cost."

N.A.C.C. Votes Against Exhibit

The Sesqui-Centennial officials first approached the automotive industry through the National Automobile Chamber of Commerce. They proposed that the N.A.C.C. participate as an organization and suggested an exhibit

in the form of a historical picturization of the development of the motor vehicle. This plan, it is understood, was laid before the N.A.C.C. several times, but each time was rejected on the ground that it would violate the policy of the Chamber not to participate actively in any automobile exhibitions other than the annual national shows in New York and Chicago.

The N.A.C.C., however, did not object to member companies exhibiting as individuals.

One automotive man interviewed on the subject advanced the opinion that the matter of cost was largely responsible for the apathetic attitude of most of the manufacturers toward placing an exhibit at the exposition. He said they thought six months was too long to maintain a display. The space was offered at $5 per sq. ft. and to obtain sufficient space to make an effective exhibit of anywhere from 5 to 10 cars or trucks would require a considerable expenditure for this item alone. Added to this would be shipping and handling costs, decorations, transportation and hotel bills for attendants, and interest and depreciation on the exhibits, the whole running perhaps above $50,000, or as far as the manufacturer wished to go beyond that figure.

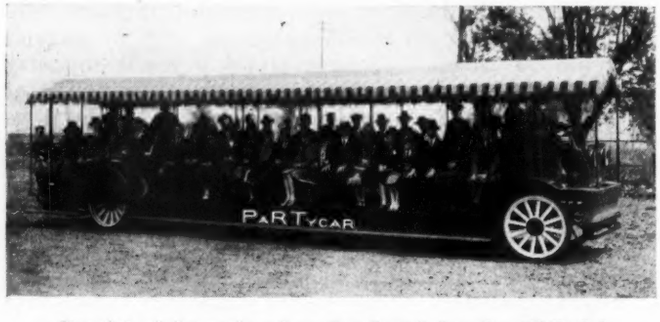
Not Sold on Value of Exhibits

The fact that the exposition will be visited during the summer and fall by millions of people from all parts of the country is not to be denied, but the automobile manufacturers evidently have not been sold on the idea that there is very much to gain in a business way by having their products on view before these visitors.

Ford seems to be the only manufacturer who has really entered into serious negotiations with the Sesqui-Centennial officials as yet, and he has sedulously avoided getting his name on the dotted line of a contract. There was no assurance at the time this was written that he would go through with his plans for an exhibit. His plans are said to call for a separate two-story Ford building with 25,000 sq. ft. of floor space, in which he would install an assembly line for operation under the public gaze. At exposition headquarters it was said the Ford factory was showing little inclination to arrive at a definite decision regarding the exhibit, and at the Philadelphia Ford branch an inquiry was met with the answer that nothing definite had been done.

At exposition headquarters there is a plan afoot to meet the objections of the manufacturers who think a six months' show is too long by proposing that a month's exhibition be held. This admittedly is a concession to the automobile men. Whether such a proposition will succeed remains to be seen.

Aside from automotive exhibits proper, the chief professional interest of automobile men in the exposition will lie in the features that have been planned for the Palace of Machinery, Mines, Metallurgy and Transportation. The U. S. Government will be one of the heaviest exhibitors in this building, 130,000 sq. ft of floor space being reserved for its displays, important among which will be aeronautical developments. Here also will be housed the exhibits of airplane manufacturers, oil companies, various types of machinery, including Diesel engines, steel companies and manufacturers of electrical equipment. Japan, too, will have a large industrial exhibit here.



Special sight-seeing bus developed by the Philadelphia Rural Transit Co. for the Sesqui-Centennial

The aeronautical program promises to be elaborate, although the airplane manufacturers, like the automobile manufacturers, have been slow in closing for display space. Fokker is one of the few who had concluded arrangements up to a few days ago.

The space set aside for airplane manufacturers is comparatively small and is suitable only for the exhibition of models and parts, but a large runway outside the building will be available for exhibits of complete planes by manufacturers who take space inside. In addition to this, the officials, according to George F. Zimmer, director of aviation of the exposition, have extended an invitation to all aircraft builders in the country to send machines to be suspended from the ceiling of the structure, and thus exhibited free of charge.

The National Advisory Committee will occupy a booth near the entrance of the building and will use electrically operated models to demonstrate various types of planes.

Army and Navy flying squadrons will be detailed to the scene for duty during the exposition and will make frequent flights. The National Air Races also will be held this year as a part of the exposition.

While automobile manufacturers may not contribute much to the Sesqui-Centennial in the way of exhibits, their products are being counted upon heavily by the officials to bring hundreds of thousands of visitors from distant points. Great areas have been marked off for automobile parking space, capable of accommodating a total of 70,000 machines at one time. Tourists who come prepared to camp out will find eight official camp sites to choose from.

One state, Ohio, has made special provision for its motorists by staking off 100 acres of parking space for the exclusive use of Ohio machines. This is probably the first time in history that a state has set up parking facilities for its motorists outside its boundaries.

Special Sight-Seeing Buses

Another feature of the exposition of interest to automotive men is a new type of sight-seeing bus which has been developed especially for the Sesqui-Centennial by the Philadelphia Rural Transit Co. These vehicles will be known as "PaRTy-cars" and a fleet of 25 will be used. The new bus is electrically driven, is 33 feet long and 7½ feet wide, containing two longitudinal seats set back to back and carrying 40 people. A twenty-one in. isle separates the two seats. The whole is protected by a seashore canopy.

The maximum speed of these vehicles will be eight miles an hour. It is thought that an average speed of six miles per hour will be maintained. Although the routes over which the sight-seeing vehicles will travel have not yet been determined, it is planned to cover the most important features of the Sesqui where travel is possible. A fare of 10c will be charged. Such a service was in operation on a smaller scale at the San Francisco Exposition.

The chassis is being built by the Commercial Truck Co. and the bodies by Brill. The Philadelphia Electric Storage Battery Co. will furnish the storage batteries. Weight complete without pasengers is 12,000 pounds, loaded 18,000 pounds.

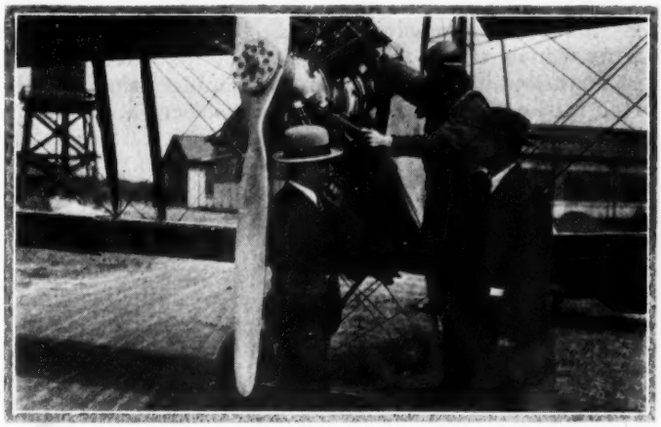
Cam is Used Instead of Crank Train in Radial Airplane Engine

New four-cylinder, air-cooled powerplant constructed for commercial use by the Fairchild-Caminez Corp. has other unusual features. Large cylinders give output of 150 hp.

By Athel F. Denham

AN aircraft engine with unusual features of design has been brought out by the Fairchild-Caminez Corp., a newcomer in the aircraft field.

During the past few years there has been a gradual trend toward the development of air-cooled radial engines for commercial use, but aside from thus arranging the cylinders there has been no radical departures in aircraft powerplant designs from the principles used in automobile engines. The development of the Fairchild-Caminez engine, designed for a specific aircraft need, may be a predecessor of further radical changes in aircraft engine design, tending to reduce cost of manufacture and increase the efficiency of the airplane as a whole.



The cam engine installed in a Fairchild plane. Left to right: Harold Caminez, inventor and designer; Capt. Richard H. Depew, Jr., pilot; Sherman Fairchild, president, Fairchild-Caminez Engine Corp.

The object in view in the design of the Fairchild-Caminez engine was to obtain a powerplant with a low speed of revolution of the propeller shaft together with a high engine speed, without the use of reduction gearing which adds to the weight of the engine and complicate the mechanism, thus obtaining without gearing efficient propeller speeds with a high, quick power output. This object has been obtained by substituting a double lobed cam mounted on the main shaft of the engine for the crank crane commonly employed in internal combustion engines. Roller bearings mounted on the wrist pins of the various pistons are kept in constant contact with this cam and its shape is such that for each revolution of the main shaft each piston will complete four strokes, or a complete combustion cycle.

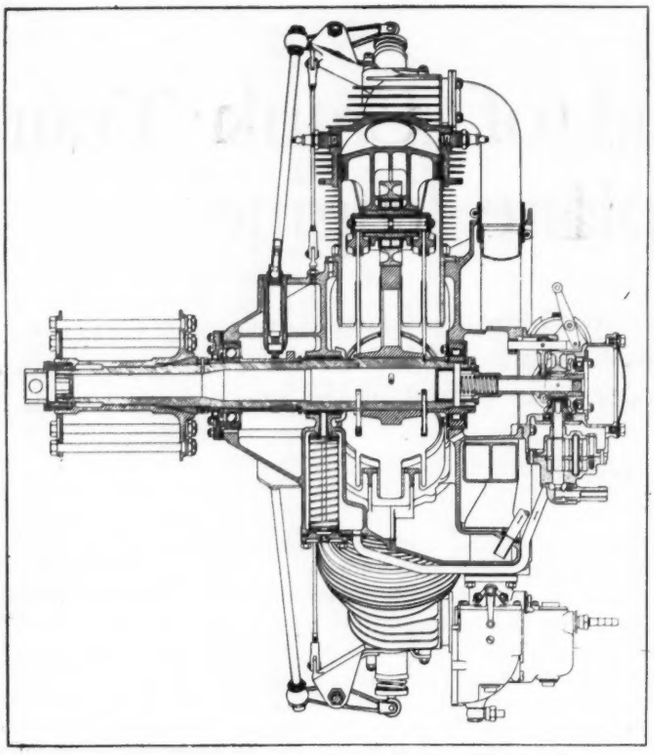
Four radially disposed cylinders are used, the design of the cam engine being such that the motion of the pistons in opposite cylinders are identical with respect to the engine axis. By this means the piston inertia forces in opposite cylinders balance each other and running balance is obtained without the use of counterweights. Due to the absence of vibration on account of this balancing of the inertia forces, it has been possible to use large cylinders (the bore is 5⅝ in.) thus obtaining a high power output (150 hp.) from only four cylinders. The use of only four cylinders also results in a wide gap between adjacent cylinders, giving a small projected frontal area (3.9 sq. ft.) and good visibility. It is not necessary to cowl the engine, due to the good streamlining of the main engine casing and the fact that the engine accessories do not project into the airstream.

Due to the fact that the main shaft of the cam engine turns at half speed, the valve cams can be mounted didectly upon it, thereby eliminating the additional camshaft and intermediate gearing commonly used. The use of only four cylinders with a relatively high power output, together with the elimination of parts and greater facilities of construction due to the cam design, simplifies manufacture and makes posible a low production cost.

Although no attempt has been made to lighten the engine by keeping down specific weights of the various parts, sturdiness and reliability being the keynote of the design, the compact construction possible through the use of a cam has enabled the designers to obtain a relatively low weight per horsepower, the engine weighing 360 lb. or 2.3 lb. per hp. The wall thickness of all castings and forgings are considerably larger than usually found in aircraft engines, facilitating machining, increasing reliability and preventing damage in handling. A further increase in reliability and decrease in friction in the engine is obtained through the use wherever possible of roller and ball bearings, which also simplifies manufacturing and assembly while eliminating the necessary scraping and fitting of plain bearings. The use of ball bearings also simplifies the oiling system, as no direct lubrication of these bearings is required.

Although the accesories on the engine are all mounted within the rear part of the engine case, they are easily accessible and can be removed without disturbing the engine installation. According to the Fairchild-Caminez Corp. it is possible for two men to completely disassemble, inspect and reassemble the engine in an eight-hour day without the use of special tools or equipment.

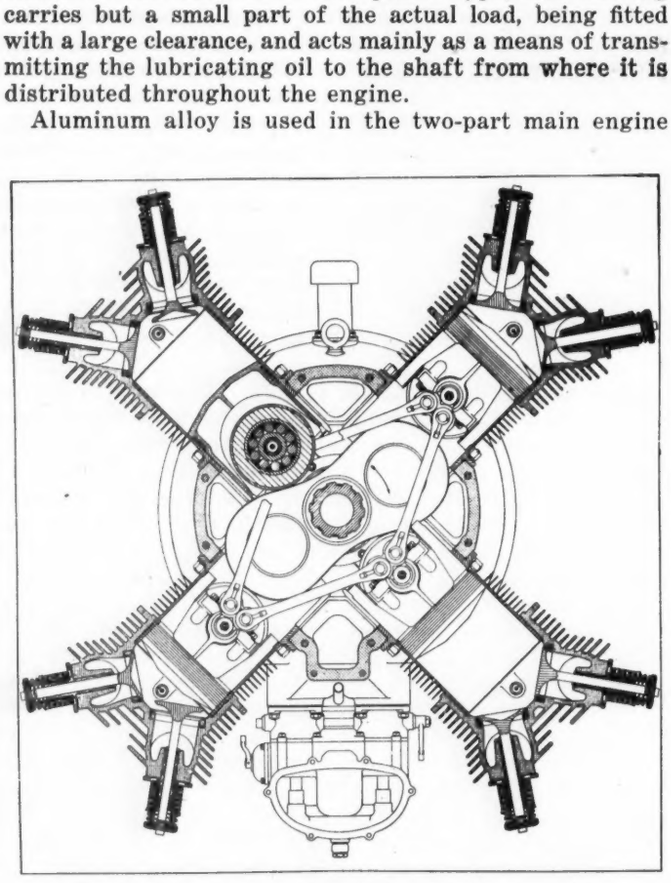
Alloy steel is used in the main shaft, splines on which



Longitudinal section of Fairchild-Caminez engine

carry the drive cam. The front main shaft bearing is a deep groove radial ball bearing which takes all the thrust load on the shaft and part of the radial load. The rear part of the shaft is supported in the engine case by a roller bearing. Although the bearing fitted at the center of the shaft is of the "plain" type, this bearing carries but a small part of the actual load, being fitted with a large clearance, and acts mainly as a means of transmitting the lubricating oil to the shaft from where it is distributed throughout the engine.

Aluminum alloy is used in the two-part main engine



Transverse section of Fairchild-Caminez engine

casing. The front and rear casings are bolted together in the plane through the cylinder axis by eight studs. A separate casting which holds the auxiliaries, consisting of two magnetos, pressure and scavenging oil pumps, and tachometer drive, is bolted to the rear main engine casing. The front casing holds the valve cam followers. A Stromberg NA-U-5 duplex carburetor is mounted on a flange on the rear main engine casing directly below the oil pump through which the intake pipes pass. Each set of opposite cylinders is connected to the same venturi in the duplex carburetor so that maximum ramming effect of the induction charge is obtained. The engine is mounted in the airplane by means of eight ⅜ in. bolts through the rear flange on the engine casing.

Steel Cylinders

The four cylinders, which consist of hardened steel finned barrels screwed and shrunk in aluminum alloy heads, are bolted to the crankcase, following the usual radial engine practice. Phosphor bronze valve guides and valve seats are shrunk in the heads. The tulip shaped exhaust valve is 2½ in. in diameter and the mushroom type intake valve has a diameter of 2½ in., valve lift in both cases being 9/16 in. Valve rocker brackets are not integral with the cylinder head casting but are of pressed steel bolted to the cylinder head at their rear end and supported from the engine case by means of a rod to reduce the push rod load on the cylinder head casting. Valve rocker and push rod mechanisms follow usual radial engine practice, with screws in the push rods for adjusting tappet clearances. The inlet and exhaust cams which operate the followers and push rods are mounted directly on the main engine shaft, the two single lobed cams operating all the valves in the engine. Cam folowers are contained in removable aluminum alloy guides with rollers mounted on floating hardened steel pins at the cam end of the followers. Lubrication of these rollers is obtained by small holes drilled through the main engine shaft.

Heat treated aluminum alloy is used in the slipper-type pistons. Ribs are provided in the pistons to increase strength and improve cooling. The piston pin is carried in the ribs projecting from the center of the piston. On this pin is mounted a double roller bearing, the outer race of which is kept in contact with the cam by means of tension rods connecting the adjacent pistons. The wrist pin is not pressed into the piston, but is assembled by means of a detachable cap, facilitating assembly. The links connecting the pistons consist of alloy steel straps with hardened steel pins keyed to their ends, the pins working in bronze bushings mounted in the pin holders below the piston pin. The loads on these links and link pin bushings are the inertia forces of the piston assembly away from the cam and are therefore dependent only on the piston speed and the weight of the assembly. The cam, morever, is so shaped that there is a practically constant load on these links at any given speed. Ample bearing area is provided for these pins to reduce the unit bearing loads on the bushings, the links and link bearings being designed with a factor of safety of ten at the rated speed of the engine.

As has been mentioned, the engine auxiliaries form a separate unit in a casting which bolts to the rear of the engine casing. The shaft driving the accessories has a straight spline at the rear end which engages with a single bevel drive gear operating all the auxiliaries, and has a spiral slot at its front end through which it is driven by a hardened pin in the main engine shaft. The auxiliary drive shaft can be moved back and forth by means of a yoke and lever. This movement gives it a rotative motion relative to the main engine shaft, there-

fore also rotating the bevel drive gear with respect to the main engine shaft and thus advances the magnetos. The auxiliaries shaft is normally held out by means of a coiled spring, in which position the magnetos are fully advanced. A standard U. S. Air Service starter flange is provided at the rear end of the auxiliaries housing for mounting hand or electric starters. The starter dog engages also with the spline on the rear end of the auxiliaries shaft, the arrangement being such that when the dog comes into engagement the magnetos are automatically retarded.

Pressure and scavenging oil pumps are of the spur gear type and are contained in a single unit which also holds the tachometer drive shaft, the oil pumps running at twice and the tachometer shaft at half engine speed. An oil pressure relief valve is contained in the oil pump housing. The pressure pump draws oil from an outside tank and delivers it to a compartment in the front engine casing which contains the oil screen. Through this the oil passes into the engine shaft, from which it is distributed throughout the engine. The strainer is made so that the oil will by-pass around the screen should it become clogged. The scavenging pump takes the oil from the sump in the rear engine casing and returns it to the tank. The propeller hub is splined to the main shaft in the usual manner and is centered on it by a hardened bronze cone, a backing-off nut being provided in the hub to facilitate removing.

High factors of safety have been used in the design throughout, the resulting detail engine parts being sufficiently heavy and rugged to minimize distortion in machining and assembly. In the preliminary 50-hour test of the experimental engine which has been completed no measurable wear was found on any of the engine parts.

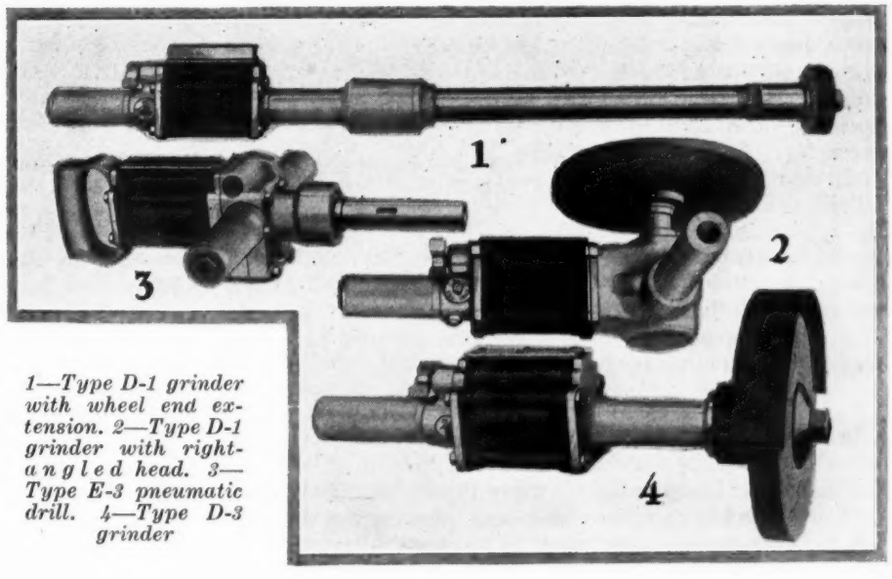
Preparations for the commercial production of the engine are now under way and the design of 80, 300, and 600 hp. are also in progress. The engines will in the near future be used in the various enterprises of the Fairchild Aviation Company, operating aerial transport, passenger carrying, aerial survey and photography aeroplanes in this country and Canada.

Additions to Warner & Swasey Pneumatic Tool Line

SEVERAL additions have been made to the line of pneumatic tools manufactured by the Warner & Swasey Co., Cleveland, O. W. & S. pneumatic grinders, it may be remembered from a description which appeared in these columns about a year ago, are operated by a motor of the eccentric vane type, similar in principle to a vane pump.

The type D-1 grinder now can be furnished with a wheel end extension, which is enclosed in a tubular housing. It is usually equipped with a cone wheel, a cup wheel or a plain wheel of small diameter, for grinding the inner surfaces of hollow castings which would otherwise be inaccessible. Grinding the inside corners of ingot molds is a good example of the class of work for which this machine is suited. The grinding wheel used is usually 4 by 1 by ⅝ in.

For use on low air pressure, such as 50-65 lb. p. sq. in., the type D-1 grinder may be provided with reduction gears. The reduction ratio being 2 to 1, the machine is very powerful and can be used with wheels up to 8 in. diameter, although it is quite light in weight. The design is adapted for use with planers, boring mills, and engine lathes, and for emergency grinding of all kinds, and is easily mounted on these machines.



1—Type D-1 grinder with wheel end extension. 2—Type D-1 grinder with right-angled head. 3—Type E-3 pneumatic drill. 4—Type D-3 grinder

For grinding large surfaces with abrasive disks the type D-1 grinder is provided with a right-angled head fitted to the motor. This type of grinder is designed particularly for grinding large surfaces on automobile bodies, and for similar work. It is purposely made very light, to reduce fatigue. When fitted with a long hose, a wide use can be made of such a grinder on automobile assembly lines, a disk of 8 in. diameter or less is used, and the weight of the grinder with disk is only 13 lb.

The D-3 is a new size of grinder for heavy duty work. It will carry grinding wheels up to 2 in. in width, has a speed of 3200 r.p.m. under load and a free speed of 4000 r.p.m. The weight without wheel is 16 lb. and the over-all length, 17½ in. A high production is claimed for this type, due in part to the absence of vibration, which is dependent upon the working principle of the motor, which permits of keeping the wheel constantly in contact with the work.

A pneumatic drill, known as the type E-3, has also been added to the line. It has the same motor as the type D-1 grinder, and, weighing 13 lb., it is light enough to be convenient with small drills, while it is said to have power enough to drill and tap ½-in holes through cast iron ½ in. thick.

A quick reversing mechanism is embodied in the control handle. This feature adapts the drill for such operations as driving taps, setting studs and running down nuts on assembly work. Three different models are furnished, with speeds of 500, 750 and 1500 r.p.m., respectively.

Iron Penta-Carbonyl Used in German Anti-Detonating Fuel

Chemical discovered in 1891 is now produced in sufficient quantities for commercial use and is on market as a mixture for ordinary gasoline.

A NEW anti-knock fuel marketed under the trade name of Motalin and depending upon iron penta-carbonyl for its anti-detonating qualities has made its appearance in Germany. The fuel as it goes into the car usually consists of about one part iron penta-carbonyl, $Fe\ (CO)_5$, to from 400 to 500 parts ordinary gasoline. As this is the first time iron penta-carbonyl has been used commercially as an anti-knock compound considerable interest attaches to a description of the results which have been obtained with it, as given in a recent issue of *Auto-Tecknik* from facts supplied by the manufacturers, the Oppau Works of the I. G. Dye Industry, Inc.

Iron penta-carbonyl, was discovered in 1891 almost simultaneously by Mond and Quincke and by Berthelot. But its preparation involved difficulties, the quantities recovered were very small, and for years it remained a laboratory curiosity. Even as late as 1922, R. L. Mond, Jr., reported that, although it was comparatively easy to produce several cubic centimeters, no one had succeeded in producing larger quantities.

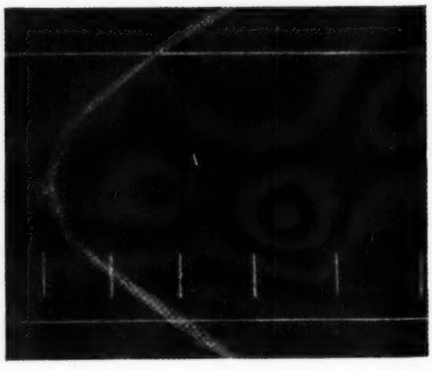


Fig. 1. Flame propagation record with untreated fuel

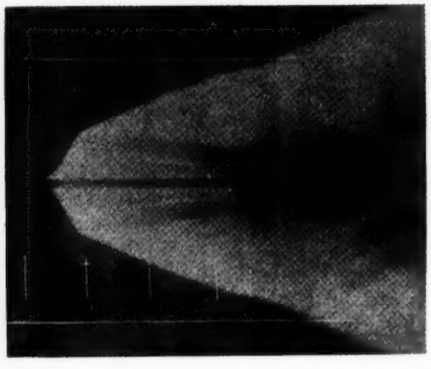


Fig. 2. Flame propagation record with Motalin

Quantity Production

In the course of research work looking to the discovery of anti-detonating materials by the Badische Anilin und Sodafabrik in Ludwigshafen, when the suitability of iron carbonyl for this purpose had been observed, extensive experiments were undertaken to develop a commercial production method. Assisted by the varied experience with high pressures, which had been gathered by it in the working of the Haber-Bosch process for the synthetic manufacture of ammonium, the firm succeeded in a comparatively short time in overcoming the difficulties and in producing the iron carbonyl in quantities that would suffice to convert all of the gasoline used in Europe into anti-detonating fuel.

Iron penta-carbonyl is a yellowish-red fluid of a specific gravity of 1.45 which boils at 217 deg. F. and solidifies at 4 deg. Fahr. The vapor pressure at 68 deg. Fahr. is about 30 mm. of mercury column, and it therefore evaporates uniformly with the gasoline. It is miscible with most of the organic solvents—with gasoline in all proportions. If protected against light it is a very stable material; when exposed to sunlight it is decomposed gradually—more slowly when exposed to diffused light—iron nona-carbonyl being deposited in gold-colored crystals. When kept in the dark it can be stored indefinitely.

This iron penta-carbonyl of the formula $Fe\ (CO)_5$ shows the surprising property of strongly influencing combustion. Figs. 1 and 2 herewith show the effects of a quite small addition of iron carbonyl to an air-hydrogen mixture. The gaseous mixture was enclosed in a glass tube 4 ft. long and was ignited at the middle by an electric spark. The flame spreads symmetrically upwardly and downwardly. The photographic records were obtained by means of a movable plate upon which equal-spaced time marks were made simultaneously with the combustion by means of a helium tube.

Fig. 1 shows the flame of a gasoline mixture without iron carbonyl addition; Fig. 2 shows it with this addition. The influence on the flame propagation is clearly shown. Whereas in Fig. 1 the flame-propagation proceeds in a shot-like manner and is completed after 2½ time periods, with the treated fuel the combustion is slowed up to such an extent that the same distance has been covered only in 5¼ time periods. The narrow strip of light in Fig. 1 also indicates a very rapid combustion, while in Fig. 2 the slower combustion produces a wider luminous band. For a better comparison the two curves of flame propagation have been plotted in Fig. 3. This experiment therefore shows the influence of iron carbonyl quite clearly.

Combustion and Detonation

Knocking of the engine is due to the fact that the normal combustion changes suddenly into detonation; the gaseous waves which now impinge upon the cylinder walls with enormous speed produce a metallic sound, and impermissably high pressures are produced. Thus the elimination of knocking, considered superficially, is the same phenomenon as the slowing up of the combustion in the experiment described. As a matter of fact,

however, the conditions in the engine are different, and these phenomena are not as yet clearly understood. There is much in favor of a theory based on the assumption of a catalytic effect on the combustion process, which results in uniform combustion (oxydation) of the carbon chains without the disruption of these chains into smaller aggregates. A number of other theories have been advanced, which have much in their favor; the question as to which of them is the correct one or whether several factors combine has not yet been decided.

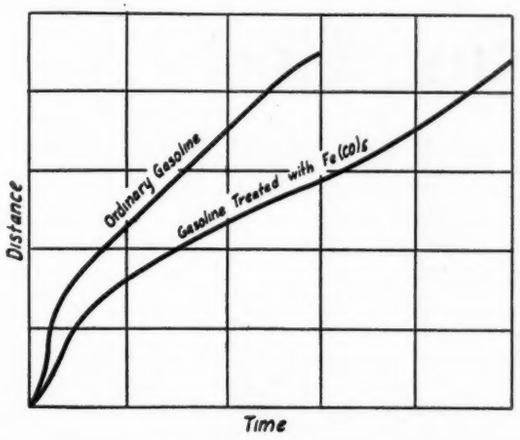


Fig. 3. Curves of Flame propagation with treated and untreated fuel

Whereas, 60 parts benzol must be added to 40 parts gasoline to stop knocking, 1 part iron carbonyl is sufficient for 400 to 500 parts of gasoline to effect the same result.

Knocking not only is injurious to the parts of the engine but also results in a reduction in engine power and an increase in the specific consumption. The comparative effects, of course, depend largely upon the characteristics of the fuel and the engine. This phenomenon is familar to every driver, and often compels a change of gear, particularly when driving up hill, when the engine is being operated under full throttle. Under certain conditions the car can be driven only on intermediate gear.

Fig. 4 shows the results of a test made on a stock four-cylinder 10-30 hp. Benz engine with a compression ratio of 6.4 to 1. The fuel was a commercial grade of gasoline of medium volatility. With throttle wide open the engine devoloped about 22 hp. at 1250 r.p.m. The tests were made without changing anything on the engine or in respect to the load, the first trial being made with untreated fuel and the rest with fuels containing increasing proportions of carbonyl. In the diagram the carbonyl additions in per cents are plotted along the axis of abscissas and the increase in output and decrease in fuel consumption along the axis of ordinates.

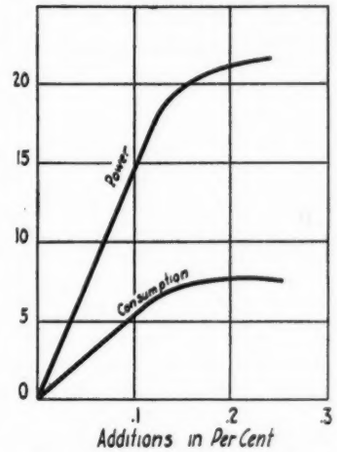


Fig. 4. Effect of Iron Carbonyl additions on power output and specific fuel consumption

With as small an addition as 0.025 per cent by volume a marked increase in power was noticeable. When 0.25 per cent was added the knocking ceased. In this case the increase in output amounted to about 22 per cent; the reduction in the specific consumption to about 7.3 per cent.

Equally favorable results were obtained in trials with a 5-ton Benz-Gaggenau truck. Over a test course of about a mile and a half, with an average grade of 8.5 per cent, the engine had to be run under full throttle. When fuel without carbonyl was used the engine knocked excessively and the output decreased to such an extent that it was often necessary to drop back into second gear, whereas with treated fuel long stretches could be driven in third and fourth speed. In these trials the use of Motalin resulted in a time saving of 27 per cent and a simultaneous fuel economy of 18 per cent. Similar tests on the testing stand and in cars have been made in large number, and all showed a favorable effect of iron carbonyl on horsepower and consumption.

An important question has been what becomes of the combustion product of iron carbonyl, iron oxide, and a careful investigation led to the following result: The iron carbonyl burns in the engine to an iron oxide so finely divided that individual particles have a diameter of less than 0.0001 mm. (0.000004 in.) and are so small as to be of colloidal nature. They are so small that, unlike other fine iron oxide, they have no polishing effect. So it is not surprising that these minute particles are blown out with the exhaust. The interior of the combustion chamber is covered with a red "breath" which does not increase in thickness even after a considerable period of use. Special tests by Bosch have shown that the life of the spark plug is not reduced; they can be cleaned in the usual manner and seem to clean more easily.

The lubricating oil also gradually assumes a brownish color, and small quantities of the iron oxide get into it. It has been found, however, that its lubricating value is not impaired; on the contrary, there seems reason for the assumption that the lubricating properties are improved by the presence of the colloidal particles, in about the same way as by the addition of colloidal graphite.

The fear that, as with colloidal systems, there might be deposition of the iron oxide in the oil and consequent choking of the oil grooves, was shown to be unfounded. Choking of the oil channels has never occurred in the practical use of the treated fuel.

Before Motalin was placed on the market it was used in an experimental way by the BASF and by car manufacturers, for a period of two years; all of the fifty motor vehicles of the works, comprising a great variety of types, were operated on the fuel. Accurate measurements were made regarding wear of piston rings and cylinder bores and observations were made regarding the effects on valves, spark plugs, lubricating oil, bearings and other parts that might be affected. Individual cars in some cases were driven as much as 20,000 to 25,000 miles and altogether several hundred tons of Motalin were used. The result was that in no case were any injurious effects on the engine observed.

THE interrupter cams used in ignition are generally made of hardened and ground steel, and this necessitates the use of a non-metallic "heel" on the contact breaker arm or the introduction of a non-metallic intermediate member between the steel cam and the arm or spring carrying the free electrode. Difficulty has been experienced in fitting the heel of non-metallic material and in keeping down the weight of the movable members. To overcome these difficulties one British maker of ignition apparatus uses cams made up of laminations of paper fiber held together by a varnish comprising a phenol-formaldehyde condensation product such as bakelite.

Common Carrier Trucks Do Not Affect Road Construction Costs

Heavy-duty highways would be built if all such traffic were ruled off. Taxes now paid by commercial vehicles cover their share of construction cost.

By Arthur T. Waterfall*
Vice-President, Dodge Brothers, Inc.

IN the formulation of highway policies there are two elements to be considered. The first is the highway engineer and the second the legislative authority which determines the source of the highway income.

Modern highway practice is based upon studies of fact. Before proceeding to construct any high-type road the state highway official today first makes a careful study of the actual and expected tonnage.

Through this survey he may find that a given highway passing through a terminal or other congested area will be required to handle an enormous volume of traffic of all kinds. Research studies have already demonstrated that passenger car traffic of great density alone will require as much as a six-inch concrete surface and that only two inches need be added to bring the surface of heavy-duty truck requirements.

Consequently, with the knowledge that all types of vehicles are going to use the highway in quantities, he proceeds to design it to accommodate all.

The essential point to be remembered, however, is that in his study he is not concerned with the legal status of these vehicles. He is not interested in knowing what function they perform except as that knowledge affects the traffic movement.

When the engineer's budget is laid before the legislative authority, however, the problem becomes one of determining the type of vehicle from a legal standpoint and to take into account the public interest in the particular type of transportation which is to be made subject to tax.

Obviously the legislator will not impose a burdensome tax upon the motor truck which is performing a distributive function.

He will not tell the farmer, for example, that his product shall not be taken to market except at a prohibitive tax, nor will he insist that the owners of hundreds of thousands of trucks used in the delivery of retail and wholesale commodities shall bear a disproportionate cost of highway development.

Neither will the railroad executive demand such rulings because his business in turn is dependent upon the development of tonnage at points off rail lines, and practically all of that tonnage is brought to railheads today by motor truck.†

Consequently it may be conclusively stated that the common carrier motor truck, generally speaking, plays no part whatsoever either from an engineering or legal viewpoint in the determination of types of highways. Heavy roads would be built if all traffic which might be deemed competitive were ruled off and in no sense of the word can the progression of types be ascribed to common carrier use. In fact the latter is simply a by-product of increasing traffic facilities.

From the standpoint of highway design, there is to all practical intents and purposes no common carrier traffic. Studies made by the Bureau of Public Roads in cooperation with several States have shown that practically all of the motor trucks in the United States are owner-operated and employed in distributive functions.

That class which handles commercial haulage is a small percentage and when from that is subtracted these vehicles which under recent rulings of the Supreme Court are rated as "contract" carriers and consequently not subject to common carrier interpretations the figure of actual bona fide truck common carrier operators is inconsequential.

Purely apart from any consideration of equity, if the burden of taxation on this type of vehicle were to be made unduly high, the only result would be that the private shipper would purchase his own trucks or obtain their carriage through contract haulers.

The result would be (and this has already been demonstrated in States like Maryland) that the State would

THERE is a tendency in some States to increase taxes levied against motor trucks in common carrier service on the assumption that such vehicles increase road costs.

The fallacy of that assumption is pointed out in this article.

"The common carrier truck, generally speaking," says Mr. Waterfall, "plays no part whatsoever either from an engineering or legal viewpoint in the determination of types of highways.

"From the standpoint of highway design, there is to all practical intents and purposes no common carrier traffic. Studies made by the Bureau of Public Roads in cooperation with several States have shown that practically all of the motor trucks in the United States are owner-operated and employed in distributive functions."

*From an address delivered at the annual dinner of the Great Lakes Regional Advisory Board of Railway Men and Shippers, Hotel Statler, Detroit, May 13.

† "It is recognized that this recommendation (i.e., added taxes for motor common carriers) segregates common carrier motor vehicles not only from private cars which have no gross or net earnings but also from motor trucks used as private carriers and not subject to private control." Report of Joint Sub-Committee, National Transportation Conference, Washington, D. C., Nov., 1923.

derive practically no revenue from this type of operation but the business of motor truck operation by owner-operators would continue to grow.

The statement is frequently made that motor trucks are being given highway facilities free. This is untrue, as witness the fact that in the twenty-nine States which segregate truck from passenger car tax returns, the trucks constitude 13 per cent of the vehicles and pay more than 25 per cent of the vehicle return.

Further, as T. H. MacDonald, Chief of the U. S. Bureau of Public Roads, has pointed out, the license fees alone paid by heavy trucks is sufficient to pay the $10,000 per mile which it is estimated they add to the cost of the road, as well as interest at 5 per cent on 33,000 of the 46,000 miles of high-type pavement in the United States. "If the other taxes paid by the heavy trucks were included," he adds, "it is probable that the total would be found sufficient to pay the additional cost of $10,000 for the entire mileage. Certainly it appears that these vehicles pay for their use of the highways."

The conclusion is that we will have heavy-duty type highways in this country whether we have common carrier operations or not; that no punitive legislation can accomplish anything more than a shift in the legal status of the truck used; and that taking it by and large the heavy truck is today paying its share of the highway costs of the nation.

Of course there will be specific exceptions to all of these cases but they will be only specific and will not effect the general condition.

From the railroad standpoint, the most constructive suggestion which can be made is that the rail lines should themselves directly or indirectly enter the field of truck operation as a medium of transportation which has come to stay and which can be fitted into the railroad structure at large profit to the older system.

No course which is designed simply to place the two agencies on an equal basis through burdening the new one is likely to furnish either an economic answer or one which the public will accept.

Coincidental Locks Are Discussed

WHEN motorists become educated to the advantages of coincidental locks there will be wider use of these theft retarding devices, according to C. B. Veal, consulting engineer, who delivered a paper entitled "Coincidental Locks" before approximately 100 members of the Detroit Section of the S. A. E., May 20.

Coincidental locks receive the highest or Group 1 rating by the Underwriters' Laboratories, but in order to satisfy the demands of a certain class of motorist it has been necessary for car manufacturers to add a switch to enable the engine to be shut off while coasting. The addition of the extra switch automatically takes the lock out of the Group 1, rating as it is then possible for a person to stop the car and engine without locking the vehicle.

In the main Mr. Veal's paper was devoted to the principles and construction of various types of steering gear-ignition and transmission-ignition coincidental locks and lantern slides were shown illustrating the parts, mechanisms and methods of installations. Among the different forms of coincidental locks shown were devices which employ no key but depend upon the setting of dial combinations for securing the steering gear and ignition while another of the dial combination types was shown for mounting on the instrument board and which in addition to breaking the ignition circuit, locks the transmission electrically.

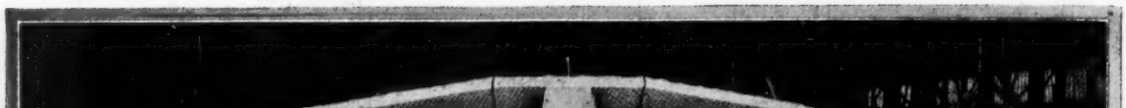
In working with coincidental lock inventors, car manufacturers, the Underwriters' Laboratories, car dealers and the automobile owners, Mr. Veal has drawn up a set of 10 specifications based upon the essential qualities desired for coincidental locks by all interested. This list may be considered to embody ideal specifications and constitutes the necessary requirements to be borne in mind in the further development of coincidental locks. According to Mr. Veal, practically all locks of this type now on the market conform to the requirements of the specifications when each item is considered separately, but no single lock is available which, while embodying all the desired features, is capable of fulfilling each requirement independent of the remainder. Mr. Veal states that present locks conform with the specifications in their entirety by only 70 per cent. The specifications which may be generally considered ideal are as follows:

1. Lock should be conveniently located and unaffected by climatic conditions. It should be possible to operate by day and night.
2. Either a key should not be required for unlocking, or locking of units should be accomplished coincidentally with removal of key.
3. There should be slight chance for accidental operation while car is in motion.
4. Operation of lock should simultaneously lock some control element of the car with the breaking of the ignition circuit. Lock should be in different location than ordinary ignition switch.
5. It should have quick action in emergency. Operation of throwing "off" should be exactly reverse of throwing "on."
6. While coasting with ignition switch "off" is not approved, the public demands ignition capable of being shut off for coasting. Coincidental locks should embody the feature.
7. It should be possible to move car with ignition "off" and without leaving key in car. (Where car is to be left in public garage or parking space.)
8. Car should be locked to prevent towing.
9. Locking car should not prevent leaving transmission in gear when parking on a hill, or prevent cramping of wheels against curb when desired.
10. Entire lock mechanism should be simple, rugged, of low cost and easy to install.

In closing his paper Mr. Veal gave statistics on the stolen car situation. Figures taken in 41 cities showed over 250,000 cars were stolen during 1925, representing a lost value of $218,000,000 when figured on the basis of an average cost of $875 per car. Due to effective work by the police and insurance companies there has been an 80 per cent recovery of the stolen cars. Of the total number of cars stolen last year only 30 per cent were covered by insurance.

It would appear from another statement by Mr. Veal—that 85 per cent of cars with proper theft retarding devices are not properly locked—that there is a distinct tendency on the part of car owners carrying theft insurance to leave their cars unlocked.

John H. Hunt of the General Motors Research Corp., called upon to express his views, stated he is very open minded on the subject of coincidental locks, but he issued a strong warning against forcing these locks on the public until the time is ripe. In many cases he said the adoption of coincidental locks by car companies has provided an additional sales argument.



A front view of the Hill "Pterodactyl," or tailless airplane. Note the rudders under the wings. These rudders control the direction of the plane and can also be used as air brakes

Airplanes Greatly Improved With Recent Developments in Aerodynamics

Advantages of tailless plane, autogiro and slotted wing and flap are described in paper read before Metropolitan Section S.A.E. Further radical improvements predicted.

By Leslie H. Allen

SEVERAL radical departures from the conventional airplane are being seriously considered in Europe. These include the slotted wing and flap for increasing the maximum lift of an airfoil; the slotted wing and flap utilized as ailerons to improve lateral control at low speeds; La Cierva's autogiro; and Capt. G. T. R. Hill's tailless airplane.

Although widely different in mechanical embodiment, these departures in airplane design have closely allied objectives. These objectives, as outlined by Prof. Alexander Klemin of the Daniel Guggenheim School of Aeronautics, New York University, before the S.A.E. Metropolitan Section at the Cafe Boulevard, New York City, May 20, are as follows:

Wings so adjustable as to give high maximum lift when desired, yet retaining their utmost efficiency in normal flight.

Wings or adjustable wings that do not lose lift at a critical point.

Wings which do not have a violent backward center of pressure motion beyond the stall.

Elevators that do not cease to be operative during the stall.

Ailerons that always provide a rolling moment without an excessive yawing moment.

Rudders that do not lose their power to overcome the yawing action of the ailerons in any flight condition.

Complete control beyond the stalling point.

Ability to glide down at a steep angle, while maintaining the longitudinal axis almost horizontal, and the vertical component of velocity at a moderate figure.

Prof. Klemin first showed diagrams of the latest form of the slotted airfoil and slotted flap as devised by Handley Page of England to meet these objectives. Lachmann in Germany hit upon the idea of the slotted front wing at about the same time.

"Opening the slot," Prof. Klemin explained, "increases the maximum lift angle to five or six deg. beyond the critical angle of the original wing. Opening the slot in conjunction with the slotted flap varies the maximum lift angle three or four deg. Beyond the stall, the slotted airfoil in conjunction with the slotted flap has a considerably smaller drag than the original wing at the corresponding angle of incidence—an important point in the use of this device as an aileron."

With the front slot closed the wing resumes its ordinary characteristics. Thus the slotted airfoil and slotted flap, working in conjunction, provide a powerful means of diminishing landing speed without impairing the performance characteristics of the plane. By careful design, Prof. Klemin believes, the use of slots might also increase performance.

The increase in lift possible beyond the usual critical angle of a wing by manipulation of the slotted airfoil and the slotted flap affords increase security against stalling, insofar as loss of sustension is concerned. The decrease in drag beyond the stalling point, as compared with the unslotted wing, opens the way to steep glides without too great a velocity along the path. But the slots have a still greater value as a means of lateral control in lieu of the conventional aileron.

Rolling Moment Increased

"Below the stalling speed," said Prof. Klemin, "a downward movement of the flap in conjunction with an opening of the front on one side, together with an upward movement of the flap and closed slot on the other side, produces a much more powerful rolling moment than is obtained with conventional ailerons. But there is an increase in the yawing moment.

"Beyond the stalling point, with the same operation, the rolling moment is vastly increased, but the yawing moment is diminished or actually changes sign, because beyond the stalling angle opening the slot not only increases the lift but also decreases the drag relative to the unslotted wing. Hence the necessity for a powerful rudder disappears and the problem of maintaining an even keel after the stall becomes greatly simplified.

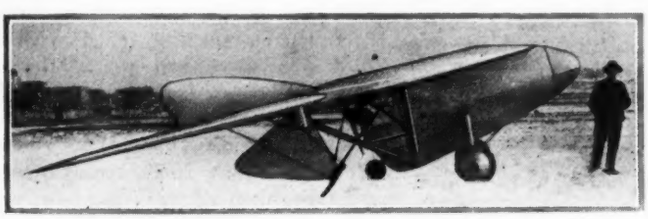
"The explanation of the phenomena involved in the airfoil slot would require a treatise. The raising of the angle of the burbling point in the slotted airfoil is closely

connected with the general problem of maintaining circulation round a lifting body, whether a wing or a rotating cylinder. The pressure at the forward surface of the wing is a maximum. Traveling along the upper surface, the air passes into a region of high suction. At the trailing edge of the wing a region of high pressure is encountered. The air particles travel as on a switchback. When the lift increases beyond a certain point and the pressure gradients encountered become large, the air retarded by the friction of the wing's surface can no longer 'make the grade' and 'burbling' and loss of lift are the result.

"In the rotating cylinder the pressure gradient is readily overcome at high lift because the friction of the surface carries the air along the surface. In the slotted wing, the rear edge of the front wing forms a region of pressure, and thereby decreases gradient from pressure to suction for the rear wing. Much experimental work and theoretical investigation will be needed before the phenomenon is completely understood."

Planes in England and Germany equipped with the slotted airfoil and slotted flap have demonstrated conclusively, according to Prof. Klemin, that these features make possible a steep descent with longitudinal axis of the plane horizontal and with complete control at angles well beyond the stalling point. Mr. Guggenheim, recently returned from Europe, reports a flight he made in a Handley Page plane, during which, at several miles an hour below stalling speed, control was maintained after purposely violent disturbances from an even keel.

While Handley Page and Lachmann were developing the slot devices, a Spanish boy in his teens, La Cierva,



This side view gives a good idea of the fuselage construction of the Hill tailless plane. The wings were detached when photograph was taken

was attacking the problem from a different angle, with his autogiro as the result. In this device four blades fixed to a collar are free to turn around an axis, moving up and down while rotating, with the angle of the blades, relative to the plane of rotation, fixed, and with the travel of the blades limited by shock absorbers.

The vertical movements of the wing provided for in this manner allow the wing to take up at any moment the position necessary for equilibrium between the air forces and the centrifugal forces, without transmitting any disturbing couples to the craft. Thereby it is possible to employ a single sustaining element.

Prof. Klemin explained that with its plane of rotation at a large angle to the horizontal, the effective angle of incidence of the autogiro's blades remains well below the critical angle. The autogiro may work at a very large coefficient referred to the plane swept by the blades, and with its plane of rotation at a large angle to the relative wind without its blades being stalled. Wind tunnel tests indicate a maximum lift at an angle of 56 deg. between the plane of rotation and the relative wind, an extraordinary range in lift coefficients, and high L/D values up to very high lift coefficients.

"Hence a remarkable absence of any tendency to stall," said Prof. Klemin, "low landing speeds, and the possibility of gliding down on very steep paths, with the machine horizontal and low vertical velocities. The autogiro has made some remarkable descents, and climbed a very steep path. It is an extremely promising type of aircraft, although it is impossible yet to judge of its efficiency."

The tailless airplane is not entirely new in conception. The Burgess-Dunne seaplane, flown in this country before the war, had a sweepback, with stability assured by placing the tips at a large negative angle. The aileron, rudder and elevator controls were combined in one set of control surfaces, and this with excessive stability hindered further development, according to Prof. Klemin. Handley Page early in his airplane experience designed a backswept, crescent-shaped wing machine which had a stationary center of pressure and early Jose Weiss gliders and the Austrian Ettrich monoplane had wings of similar character.

No Definite Stalling Point

The main claim made for the tailless airplane, according to details received from England by *Automotive Industries*, is that there is no definite stalling point to the machine, and that if the minimum speed of flight is lost the aircraft maintains an even keel but sinks more rapidly, while still under good control. Further, it is possible to transfer from stalled flight to unstalled flight without any kind of dive to gain speed, such as is imperative in the normal airplane and is a danger when it is near the ground in a stalled condition. If the control stick is eased forward the tailless airplane hardly changes its attitude to the horizon, but the speed of descent is reduced to that of the normal height loss when gliding.

In addition to this there is only one attitude of flight possible for one setting of the controls. If the attitude of the plane is altered due to a gust of some kind, it is not necessary for the pilot to use his controls to bring back the plane to its original attitude, as it will of itself resume this position. This is achieved by having large control surfaces mounted on the wing tips well back of the center of gravity. These surfaces do not form part of the wing in that in normal flight they do not exert any lift, but lie along the wind direction. If the altitude of the plane changes, a pressure, either upward or downward will be exerted on these surfaces, which will bring the plane back to its original position.

Due to the absence of the tail, the principles upon which rudder action are based had to be changed in the Hill "Pterodactyl." Two rudders are fitted on the ship, one under each wing, well away from the center of the fuselage. These rudders are not operated together but one at a time. When one rudder is turned the drag on that side increases, causing the plane to turn toward that side. A further advantage is obtained by this system of control, as the rudders act as air brakes when operated together in opposite directions. By this means the gliding angle can be increased, facilitating landing in small fields or fields surrounded by high obstacles.

Prof. Klemin believes that further remarkable developments in aerodynamics are imminent, increasing immeasurably both the utility and safety of heavier-than-air craft.

"In the future, increased longitudinal control may be relied upon more than inherent longitudinal stability," said Professor Klemin.

Archibald Black, chief engineer for the Air Transport Corp., discussed landing fields and airports with slides showing developments in this branch of aeronautics, and Lieut. H. S. Kendall, U. S. N., in charge of Naval Reserve aviation training in the Third Naval District, presented a motion picture, "Wings of the Fleet."

THE FORUM

Vice-President of *Operation* and *Maintenance* Seen as S. A. E. Need

Writer to Forum contends that this branch of industry is entitled to representation in shaping affairs of Society.

IT has been suggested that the Society of Automotive Engineers add to its list of officers a Vice-President for Operation and Maintenance and that it eliminate from that list the present Vice-President for Stationary Internal Combustion Engineering.

The question is one which has some aspects of quite general interest, despite the fact that the specific problem itself is, of course, the business of the Society alone. *Automotive Industries* commented on the subject editorially in its issue of April 29 and considerable discussion is going on among members of the Society on the subject.

An unusually good presentation by a proponent of the suggested innovation is contained in the accompanying letter received recently. Other comments will be welcome, as a rather full discussion seems desirable before final decision is made.

Editor,
AUTOMOTIVE INDUSTRIES:

There has been brewing in the S.A.E. for some time a feeling that the operation personnel should have a wider representation than in the past. Despite the doubts which exist in the minds of some as to whether the S.A.E. should continue to increase its activities along transportation and operating lines, I believe that in reaching out into this field for membership the Society has been materially strengthened and that solicitation of membership from this class of men was a wise move on the part of the Council.

In looking over the transactions of the Society, Charles Manly, past vice-president, sets forth very ably the needs for engineering in operation, and to place clearly before you his viewpoint on this subject and the scope of the field of this work to be ultimately covered, I quote the following:

"The work of the automotive engineer is not finished, but merely begun, when the machines are designed and built, whether they be motor trucks, tractors, aircraft or other vehicles. There is more need today for real engineering work in connection with the planning and organization of the operating end of automotive vehicles and machines than there is in connection with the design and construction of them, just as there are more engineers engaged in the operating and maintenance end of railroads than are engaged in the design and construction of locomotives and railroad cars.

"In the subdivision of automotive engineering work having to do with motor trucks, the real work of the engineer has hardly as yet been begun.

"Similarly, in that newest of the branches of automotive engineering, which is just now in its beginning, but which is destined to grow to be one of the biggest of the brothers in the family of giants springing from the union, under the magic influence of the electric spark, of atmospheric air and petroleum in the internal-combustion engine, the commercial operation of aircraft, the scope and importance of the problems that must be given immediate and careful attention and study by the engineer are so great that I venture the prediction that within the next ten years there will be a larger number of engineers engaged exclusively on them than there are today in the total membership of this Society.

"I venture a prediction that within twenty years from the present time there will be a larger number of automotive engineers in this country than there are members today in the entire engineering profession, and I understand that recent estimates place this membership at 60,000. I wish that I had the talent of word artistry to paint for you the wonderful picture that I see of the development and progress that are sure to come in the field of automotive engineering in the next few years.

"The day when the master builder could have a path worn to his door, even though he built his house in the woods, has, I think, sufficiently passed away to make it a dangerous mode of procedure in this day and generation."

It is evident that Mr. Manly had a great deal of foresight in pointing out that there was a direct field for engineering in the operating end of the business, for it is certain that some of his words are coming true and that this field of endeavor is becoming one where the operations are becoming of such a size that the problems involved, as well as the remuneration offered, will result in a very desirable class of men, or engineers, seeking out this line of work.

Assuming further that Mr. Manly's thoughts were correct, it seems logical to assume that the Society

should be engaged in activities that concern motor vehicle operators and service men, for it is certain that their problems are primarily the concern of engineers, and if no provision is made for bringing out their ideas certainly nobody will be the loser but the engineers themselves.

It has been stated "That the wonderful spirit of cooperation that exists in the S.A.E. has been responsible for its remarkable growth." Extending the activities into this sphere of usefulness is only more evidence of this spirit of cooperation that must ultimately result in direct benefit to the engineers associated with the Society, as well as the industry.

Personally, I feel that the S.A.E., by taking hold of both the service and the operation end, by recognizing it through the establishment of a vice-presidency of Operation and Maintenance, will tend to place this end of the industry in a more favorable light than it has enjoyed in the past.

The question has arisen as to just what the vice-presidency of Operation and Maintenance would represent. Would it represent only motor vehicle operators and service men?

This point would rest entirely in the hands of the Nominating Committee; its hands in no way would be tied by any group of men. A vice-president representing this group could be selected from any one of the various branches of the industry represented. He might be an outstanding operation and maintenance man in the motor vehicle field, the aviation field, or any other line of activity with which an engineer within the Society comes in contact, and I am certain that with the representation of operation and maintenance men that are in the Society, and the group of men who are now following straight engineering lines, some of whom will see the opportunity in this new line of endeavor and will change from their present activities to it, as well as new men who will join from time to time, will give the Nominating Committee a wide field from which to make a proper selection, and it is reasonably certain that any man chosen from such an active field will take a great interest in our work; more than has been shown by such a dormant field as has been represented by the Vice-Presidency of Internal Combustion Engineering.

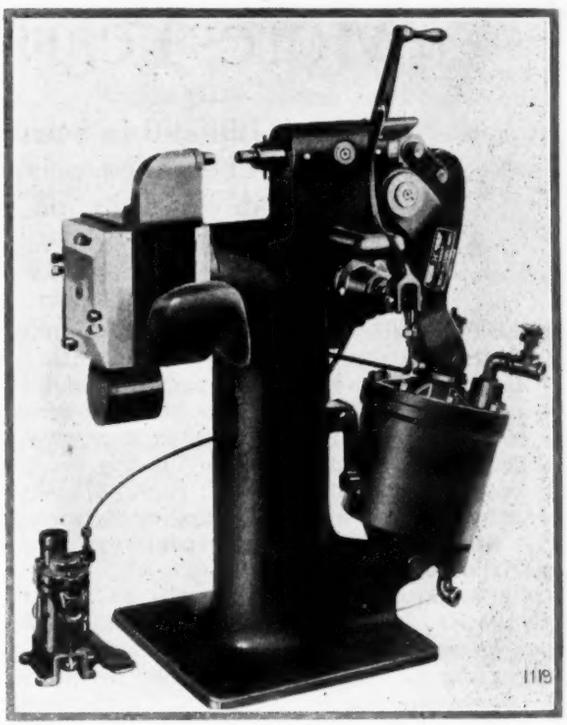
J. F. WINCHESTER,
Baltimore, Md.

New Hanna Turret Riveter

THE Hanna turret riveter is the latest addition to the line of riveters developed by Hanna Engineering Works, Chicago, for cold riveting automobile chassis frames complete. The main feature of the new riveter is a rotating turret head for mounting four horns or noses and by means of which any one of these heads may be indexed in position to bring a stationary rivet die into alignment with the movable die mounted on the ram.

Since it is these noses which enter the inside of the frame and so must conform with the space available for clearance at various rivet locations, the new machine, because of its four noses of different sizes, is claimed to be the equivalent of four yoke riveters or presses of like reach, gap and tonnage. The pressure exerting mechanism is similar to that used in the standard Hanna Rapid Type riveters. The principle features of the design are air cushions at both ends of the piston stroke, combined pressure flood feed lubrication, and piston packing adjustment from the outside.

The mechanism is a combination of lever and toggle, combining a long die stroke with a wide range of uniform pressure. The turret head has a spindle which rotates in a hole through the riveter frame barrel. The head is locked in position with any of the four noses in alignment by means of an index pin which selectively engages four holes spaced around the surface of the turret spindle. The index pin movement is air operated while the spindle is rotated by hand. Movement of the riveting mechanism is controlled by a pedal which when stepped on advances the die and when pressure is removed from it the valve is reversed and the die returns. The air is automatically cut off when the die returns to neutral position.



View of Hanna turret riveter

The riveter may be operated as fast as 50 cycles per minute. It occupies a floor space of 30 by 40 in. and is 45 in. high.

FROM information furnished to the (British) Board of Trade in connection with an inquiry regarding British trade and industry, by the Society of Motor Manufacturers and Traders, it appears that the amount of capital invested in the British automobile industry at present is approximately £50,000,000. About one thousand firms are engaged in Great Britain in the production of automobiles, parts and accessories and in the wholesale distribution of these products, and there are about 12,000 retailers.

The S. M. M. T. recommends the plan followed in the U. S. of issuing highway bond issues under Government credit and also advocates a return to the gasoline tax. The Society was organized in 1903, the immediate object being the control of motor car exhibitions.

A COMPLETE report of the 1926 Convention of the American Road Builders Association, which was held in Chicago, January 12 to 14, has been published by the Association. The report contains all papers delivered as well as the discussion which followed, and a list of the exhibitors.

$150,000,000 is Authorized for Two More Years of Federal Aid

Dowell Bill still in Senate, but passage is assured. Provides for Federal participation in State highway extension during 1928 and 1929. Opponents still active.

By K. W. Stillman

THE Dowell Bill providing for Federal Aid for highway construction has passed the House of Representatives with very little opposition and is now before the Senate where its passage has been assured by Senate leaders. The bill authorizes an appropriation of $165,000,000 covering expenditures for the fiscal years ending June 30, 1928, and June 30, 1929. $75,000,000 is to be expended each year to aid the States in road construction while $7,500,000 is to be spent yearly for highway construction in national forests.

In spite of the ease with which the bill was rushed through the House all opposition to Federal Aid has by no means disappeared. Elimination of this item of expenditure from the Federal budget would be in line with the strict economy campaign of the present administration and it is not impossible that when other means of reducing government expenses fail this measure or similar bills may meet with definite resistance from the administration that happens to be in power.

Other objectors, who have always fought Federal Aid and are likely to continue to do so as long as it is practiced, are unofficial representatives of some of the eastern States. These States, particularly those which already have a fairly complete system of improved roads and which also pay considerable proportions of Federal taxes, have always possessed loyal citizens who profess to see in Federal Aid a plan by which other States are enriched at the expense of their own commonwealths.

Just what influence these factors in opposition to Federal Aid will exert on present and future legislation is impossible to evaluate accurately. The indications are, however, that the present battle, even when won, will not be the last of its kind.

Same Arguments are Used

The reasons advanced by present opponents to Federal Aid are similar to those used in the past and, probably, they will not undergo much alteration in the future. They fall into three general classes: That Federal Aid for highway construction is unconstitutional—Federal usurpation of States rights; that the funds are not equitably distributed, some States contributing much more to the fund than they get back in Federal Aid, and that Federal appropriations are too large and compel States to overburden themselves in order to take advantage of the aid offered by the Federal government.

In an article appearing in this magazine just about a year ago—March 26, 1925—the warning was given that although the bill continuing Federal Aid during 1926 and 1927 has been adopted, proponents of the measure should not become overconfident of continued success. The continued murmurings of the opposition throughout the course of the present legislation is evidence that this warning was not unjustified and that continued adherence to the policy of Federal Aid for highway construction is by no means assured.

At the House hearings on the Dowell Bill the following national organizations, representing many activities, presented arguments in favor of the legislation: National Automobile Chamber of Commerce, Chamber of Commerce of the United States, American Automobile Association, American Road Builders Association, American Bankers Association, American Association of State Highway Officials, American Farm Bureau Federation, and National Grange.

New Conditions Arising

The arguments presented by these various organizations were, in large measure similar to those which have been presented on previous occasions and so are familiar to most persons who have followed the progress of Federal Aid since 1922. As Federal Aid work continues, however, new conditions arise which tend to make the original arguments in favor of the policy stronger as well as to give birth to new factors which have a pronounced influence upon the value of Federal assistance in highway construction.

For this reason it may be of value to review the outstanding arguments in favor of Federal Aid which have been used successfully in past years and to call attention to the new favorable conditions which have arisen. Inasmuch as practically all objections to Federal Aid may be allocated to one of the three groups mentioned before, the arguments in favor of such legislation will be considered in relation to their bearing upon these three factors.

The constitutionality of Federal Aid has been severely questioned. This probably will continue to be a matter of dispute but it is quite possible for an individual to exercise his judgment upon the basis of known facts.

Among the items for which the Federal Constitution places responsibility upon the Federal Government may be found the following:

1. To provide for the common defense.
2. To establish post offices and post roads.
3. To regulate commerce among the States.
4. To promote the general welfare.

With the experiences of the World War so fresh there should be no doubt in any one's mind as to the value of a good highway system in time of war. Movement of men and materials for prosecution of war as waged today would far overtax our railroads and without a proper national road system by means of which motor vehicles could be extensively used to assist the railroads in moving supplies and personnel the effectiveness of our armed forces would be seriously hindered.

In 1921, speaking before the Senate Committee on Post Offices and Post Roads, General Pershing said, "The country road will be of tremendous value in time of war; . . . the roads must be relied upon to obtain the needed food supplies.

A reasonable interpretation of the first item quoted from the Federal Constitution would indicate that Federal construction of roads is proper from a defense viewpoint alone.

Provision of postal service has been a Federal function from the beginning of the Government and there have been no objections made of this policy. As transportation facilities have increased the service rendered by the Government has expanded in the endeavor to make satisfactory postal service universal throughout the nation. An important step in this direction was the institution of Rural Delivery, whereby the highways of the Nation became of great importance to the postal service.

In carrying out this important function which was assigned to it by the Constitution the Federal Government is using over 1,205,000 miles of highway every day in order to provide postal service for some 30,000,000 citizens. But there are still over 14,000,000 citizens who have yet to receive this service and the Federal Aid plan is concerned with the improvement of only about 200,000 miles of roads.

The Federal Aid plan offers assistance in the construction and maintenance of only about 17 per cent of the mileage which is essential to proper conduct of a function specifically directed by the Constitution and which affects over 25 per cent of the country's population. Nearly 14 per cent of the citizens are still unprovided with proper postal service due to lack of roads. To give this service would require the use of over 500,000 miles more improved roads than are now employed by the postal service, basing mileage per person served on present conditions.

Monetary Advantage

In addition to the necessity of good roads in order that the nation may effectively carry on the functions imposed upon it by the Constitution, the increase in good road mileage coupled with the extended use of motor vehicles has been of considerable monetary advantage to the postal service. By the use of motor vehicles over improved highways rural mail carriers are enabled greatly to increase their routes over the 24 miles upon which their pay is fixed. The Government pays $75 per mile for distances up to 24 miles and only $30 per mile for greater distances. This saving of $45 per mile has amounted to about $7,000,000 per year according to the Assistant Postmaster General.

Again, a reasonable interpretation of the constitutional provision concerning post roads would appear to make Federal road building and maintenance proper—and even necessary.

The items of regulation of interstate commerce and promotion of the general welfare do not lend themselves to statistical analysis but the favorable influence which a national system of highways has upon them seems so obvious as to need no proof. Regulation of such commerce by railways has been accepted as a Federal function yet of how much greater importance to the nation as a whole is the mutual understanding between States and communities which has come and will continue to come from intermingling of the people by means of motor vehicle travel over the highways.

"To understand an enemy is to gain a friend." What better way is there to promote the general welfare of the nation than to provide means whereby citizens of one section or State can learn to understand the conditions prevailing in other sections? What better way is there to overcome ignorance of the affairs of other States which has led to intense sectional strife in the past and is still a prevalent cause of sectional antagonisms than to provide means for residents of each section to visit and learn first hand of conditions in other sections?

Welding the Nation Together

The automobile is the most important factor in bringing the people of the Nation together and a properly coordinated national system of good roads is a prerequisite to fullest use of motor vehicles in interstate travel. Federal assistance in maintaining such roads appears to be an important item in carrying out the constitutional function of promoting the general welfare.

As a final argument in favor of the constitutionality of Federal Aid the United States Supreme Court has handed down three decisions in each of which this policy was clearly upheld.

The arguments that the Federal-Aid funds are not equitably distributed but that some states pay more than

Comparison of State allotments necessary to meet Federal Aid and actual State highway expenditures, 1925.

State	Federal Aid Allotment	Actual Expenditures for Highway Work
Alabama	$1,542,000	$ 7,360,000
Arizona	1,056,000	3,300,000
Arkansas	1,264,000	12,000,000
California	2,473,000	11,800,000
Colorado	1,373,000	4,150,000
Connecticut	475,000	10,200,000
Delaware	366,000	2,207,000
Florida	893,000	7,764,000
Georgia	1,983,000	6,650,000
Idaho	937,000	2,200,000
Illinois	3,191,000	52,175,000
Indiana	1,939,000	13,744,000
Iowa	2,070,000	9,384,000
Kansas	2,074,000	3,625,000
Kentucky	1,412,000	8,786,000
Louisana	997,000	8,000,000
Maine	685,000	4,880,000
Maryland	636,000	6,597,000
Massachusetts	1,090,000	13,426,000
Michigan	2,225,000	25,500,000
Minnesota	1,124,000	18,000,000
Mississippi	1,292,000	3,250,000
Missouri	2,418,000	27,000,000
Montana	1,548,000	1,775,000
Nebraska	1,582,000	5,250,000
Nevada	948,000	1,755,000
New Hampshire	366,000	3,500,000
New Jersey	935,000	19,225,000
New Mexico	1,185,000	2,150,000
New York	3,657,000	40,000,000
North Carolina	1,699,000	16,500,000
North Dakota	1,181,000	2,700,000
Ohio	2,790,000	29,000,000
Oklahoma	1,755,000	9,000,000
Oregon	1,180,000	6,000,000
Pennsylvania	3,360,000	53,000,000
Rhode Island	366,000	3,000,000
South Carolina	1,053,000	5,100,000
South Dakota	1,215,000	4,827,000
Tennessee	1,623,000	10,700,000
Texas	4,416,000	17,000,000
Utah	846,000	2,933,000
Vermont	366,000	2,637,000
Virginia	1,450,000	8,378,000
Washington	1,119,000	9,500,000
West Virginia	797,000	12,000,000
Wisconsin	1,873,000	8,799,000
Wyoming	935,000	2,903,000

Postal Service Road Needs

Highway Mileage used by U. S. Postal Service	1,205,000
Additional mileage needed to give service to all citizens	500,000
Total mileage needed to carry out Constitutional provisions regarding postal service	1,705,000
Total mileage in Federal Aid System	280,000
Total mileage Federal Aid roads thus far improved	128,000

they get out of it has been presented mainly by representatives of eastern States. Distribution of the fund is made on the basis of one-third according to the ratio which the area of each State bears to the area of all States; one-third in the ratio the population of each State bears to total population; and one-third in the ratio of rural delivery and star routes in each State to total mileage of such routes in all States.

A number of States, mostly in the East, pay proportionately more taxes than they receive Federal Aid under this distribution plan and they feel, therefore, that they are paying for road construction in other States and that such a condition is unfair. High taxation depends to a considerable extent upon centralization of business in certain centers where surplus funds gravitate from other parts of the country, where power is cheap and where labor is close at hand.

Wealth from Other States

The fact is, however, that very few of these States with such high taxation could continue to exist at all, and certainly not in their present prosperous condition, were it not for their neighbors. New York State, for example, is the richest state in the Union, not because of its own natural resources, but because in New York City it has a great center of commerce and industry which reaches and taps nearly every source of wealth in the country. New York City is vitally interested in the prosperity and development of every part of the country, for in that development and prosperity is the source of its own success.

This is true, to some degree at least of every State in the Union. With the close inter-relation of commerce and trade among the States anything which aids the development of one is also beneficial to all others. Many States are so lacking in wealth or population that bearing the total burden of a good roads construction program would be impossible, but the completion of such a program would open up the State to intensive industrial, commercial or agricultural expansion which would benefit all the States.

From a simple business standpoint extension of aid by the other States would appear to be desirable and profitable, particularly so when the burden carried by any State is so small and the possibilities of return from the investment are so large.

This objection would have more weight if it were based up on Federal Aid in construction of the entire State road systems. Of the entire mileage of roads in any State probably a considerable proportion might be developed or neglected with little effect upon the Nation's prosperity. But when the aid is restricted to but 7 per cent of the total mileage in any State and to those roads which will form an integral part of a national highway system such objections appear unreasonable and scarcely worthy of serious consideration.

All the above argument was summed up by Thomas P. Henry, president of the American Automobile Association, when he said, "The slight objection to Federal Aid urged so far is that the wealthy States are taxed to pay for roads for less prosperous States. States are prosperous not because they are political units but because the whole country is prosperous, and the States that have the greatest wealth supply the Nation with the most commodities. States that pay the most taxes to the National Government contain the legal headquarters of the largest number of corporations, enriching themselves through a national trade."

U. S. Large Land Owner

Another argument in this same connection was advanced by Mr. Henry when he said, "The Federal Government holds title to some 407,000,000 acres or 21 per cent of the lands in all the states. The greater part of these lie west of the Mississippi River. It is no part of wisdom or fairness to demand that States in which the National Government owns from 20 to 80 per cent of the land shall build roads within their borders to accommodate the few people of these States and the hundreds of thousands who motor across them for business or pleasure. Besides, the wealthier States have the greatest number of motorists who make use of the highways."

The third type of objection to Federal Aid—that the size of Federal appropriations causes the States to overburden themselves to keep up the pace set—very easily can be met statistically. During 1924 total funds needed to be appropriated by the States in order to meet Federal Aid appropriations was about $67,000,000, whereas actual expenditures during the year for other than Federal-Aid projects amounted to $413,000,000. During 1925 total expenditures through State highway departments was over $596,000,000 while Federal-Aid requirements remained about the same as for 1924.

The State of Illinois, for example, has received Federal Aid during 1924 and 1925 to the extent of about $8,000,000 and during the same period has spent a total of $75,000,000 or the equivalent to the entire Federal-Aid appropriation for a year. During the last six years the State of North Carolina has spent about $100,000,000 on roads and has received Federal Aid to the extent of about $5,000,000. These examples might be multiplied to show that while Federal Aid may be and probably is an incentive to greater highway expenditures than would otherwise be made, it is not over-burdening any State simply to meet the Federal-Aid appropriation, but most of them are going far beyond that in highway expenditures.

The Federal-Aid system is by no means complete and many more years of continued progress will be necessary before the original plan of improving 7 per cent of the State road mileage is completed. At present less than 50 per cent of the mileage in the Federal system has been improved, and, because of the type of construction used on some of this, continued expenditure upon possibly half of that already completed will be necessary to keep it in serviceable condition.

The total allowable mileage in the Federal system is something over 280,000. The total actually approved for the system up to July 1, 1925, was nearly 179,000 miles and the amount improved and under construction on February 1, 1926, was slightly over 63,000 miles. Of the remainder it is estimated that the States have improved without Federal Aid about 65,000 miles, leaving some 150,000 miles still to be improved.

EDITORIAL

Pre-Ignition and Detonation

IN talks on detonation, investigators who have been making researches on the subject have often emphasized the point that detonation and pre-ignition are not the same thing, and sometimes the statement has been made that there is no connection between the two.

Detonation consists in—or results from—the generation of excessively high pressures in the combustion chamber. That it should be possible for the pressure in the cylinder to reach a value of 1,000 lb. p. sq. in. or more is not surprising, for if we take the heat content of a unit quantity of fuel and calculate the temperature which this amount of heat should impart to the quantity of mixture corresponding to this amount of fuel, on the basis of the average specific heat of the products of combustion, we reach a figure very much higher than any temperature ever measured in an engine in normal operation. This higher temperature corresponds also to a much higher pressure than that normally obtained on explosion.

In order that the liberation of the heat may cause the maximum increase in the temperature and pressure of the charge, it is not sufficient that combustion be initiated (ignition effected) at an early period in the cycle, but it is also necessary that the combustion be completed very rapidly. With a slow-burning mixture combustion might not be completed until the piston was half-way down on the power stroke even though ignition took place some 30 or 40 deg. ahead of top dead center. It is obvious that under these conditions it is impossible to obtain any very high pressure in the cylinder, because at the time the combustion chamber is of minimum volume, when the piston is at the top end of the stroke, only a small fraction of the heat of the fuel has been imparted to the charge. Detonation evidently necessitates both early ignition and a rapid burning charge.

Automobiles Don't Cause Crime

THAT the automobile and motor truck have become potent weapons for law-breakers cannot be denied. But to say that the motor vehicle is a cause of crime is just as incorrect as to say that dynamite is the cause of crime simply because certain of its properties adapt themselves to criminal uses.

Every device which has been invented for increasing the comfort, happiness or economic efficiency of the human being can be used to thwart as well as to advance social interests. The coming of the motor vehicle has changed radically the social and physical conditions of our existence in the United States and has made necessary readjustments of old laws, customs and methods, which always change more slowly than knowledge of possible improvements.

Just the other day the Department of Justice laid to increased use of automobiles and trucks the increase in commercial frauds in the United States. Unlawfully spiriting away of merchandise, which once could be traced through the local freight station, now is easily removed by motor vehicle without leaving a trail. Thus more people are able to perpetrate frauds under the bankruptcy laws. The same day a committee of the Illinois State Bar Association reported their opinion that the advent of automobiles and good roads have brought about such changes that "the bulk of the criminal statutes now in force should be wiped out and laws to meet present conditions should be enacted."

The motor vehicle increases the power of law enforcing agencies, just as it increases the facilities for criminal effort. Laws and crime enforcing facilities undoubtedly need revision to meet the changed conditions, but in discussing such questions it is not fair to brand the automobile as a cause of crime. In certain instances the automobile does increase the criminal's efficiency; but it does not cause crime.

Costly Cancellations

WHEN the big slump came back in 1920-1921, automotive parts makers suffered materially through cancellation of contracts by vehicle makers. In many cases these contracts were legally binding, but attempts to enforce them through litigation not only would have been costly but also probably would have eliminated for the parts maker any possibility of future business from that particular customer.

The protests which parts men set up at that time were not based on the idea that, under the circumstances, their customers should have lived up to the last legal letter of the contracts, but that a reasonable degree of consideration should have been shown in the cancellations so that both parties to the contract would bear a fair share of the load. A good many vehicle builders, as a matter of fact, did handle their commitments in this way, trying sincerely to ease conditions for their suppliers as much as possible. In some instances. however, cancellations were ruthless.

Following that trying period, conditions as regards validity of contracts improved and in recent years a much stronger tendency to observe the moral as well as the legal obligations involved in contracts has been in evidence.

Unexpected cancellations still are far from rare, however. In many cases, of course, prices are quoted on the basis of large quantities permitting minimum price with cancellation entirely up to the buyer. Legal obligations are not in question in instances of this kind, but a prevalence of the practice of sudden cancellations cannot help but eventually raise the average price of parts in general. Better planning and more careful market analysis is helping to reduce the necessity for sudden stops and starts in shipping orders, but much still remains to be done in this phase of elimination of waste.

AUTOMOTIVE NEWS SECTION INDUSTRIES

Philadelphia, Pennsylvania

Thursday, May 27, 1926

New Parts Orders Indicate Higher Production in June

PHILADELPHIA, May 27—Sales of motor cars, trucks and other automotive products continue strong, with no apparent indication so far of any considerable recession from the peak of spring activity. Production has been on a fairly conservative basis, all factors considered, and as the result of the reduction in accumulated stocks, two or three of the large volume producers have been able to increase their schedules. May output of cars, however, is likely to be somewhat under the April level, as a result of quite general curtailment. The drop will not be great, and there are already signs that the downward trend has been checked. Orders for June delivery of original equipment are coming in strong, indicating to many trade observers that next month's output will exceed the total of May business.

Perhaps the most notable feature of the year's automotive business to date is truck and bus output and sales. These have consistently been making records, with no indication of a let-up. In both commercial and passenger vehicles foreign sales continue on a highly satisfactory basis.

An anomaly of the period of prosperity that most of the branches of the industry are going through is that on the retail end there has been a definite decline in good merchandising principles. Whether because new cars have been easy to sell, or because of the crowding of dealers by some automobile makers, used car stocks have mounted at a rate which constitutes a definite hazard for the retailer that will be felt as soon as new car sales slacken considerably.

The situation is complicated by the heavy weight on the used car market of large numbers of repossessed cars, representing vehicles sold on time during the credit debauch that swept the industry last fall and early winter, to persons unable or unwilling to pay for them.

Continental Directors Defer Argyll Decision

DETROIT, May 25—The board of directors of Continental Motors Corp., in session today, took no action on adopting a policy for the manufacture of the Argyll engine.

It was indicated on the recent return from Europe, of W. R. Angell, vice-president of the corporation, that a decision on whether Continental would retain complete manufacture of the engine or licensing its manufacture to other car and engine builders, would be definitely decided upon by the board at their today's session.

New Willys-Knight Sedan

TOLEDO, May 27—Willys-Overland is now in production on a two-door sedan model in the Willys-Knight "70" line, the factory price on which is $1395.

Nash Absorbs Ajax—Car Now Light Nash

Major Change is Uniting of Companies Under One Name —Personnel Continues

KENOSHA, May 27—Formal announcement is made by Nash Motors Co., of the absorption of Ajax Motors Co., its subsidiary, into the parent company and the changing of the name of the Ajax car to the Nash Light Six. The general Ajax personnel will continue to function in the handling of the car under the new name, the major change being simply the discontinuance of the Ajax as a separately named organization.

From a sales and advertising policy standpoint there will also be no change as Ajax has been merchandised by the general Nash sales organization since Jan. 1, E. H. McCarty, Nash general sales manager advises.

The Ajax company was formed in July, 1924, to take over title to the plant and property at Racine, Wis., formerly belonging to the Mitchell Motors Co., which was acquired by Nash Motors Co. in January that year for approximately $403,000. The authorized capital was $3,000,000 7 per cent cumulative preferred stock and 30,000 shares of no par common, all of both classes of stock being subscribed for by Nash Motors.

During 1924 Ajax purchased for $225,000 the machinery, tools and other equipment of Lafayette Motors Corp., of which Nash Motors owned a majority of the first preferred and common stocks. The Lafayette company was dissolved in April, 1925.

Under the consolidation manufacturing facilities for the light six line are increased, Nash Motors declares.

APRIL OUTPUT SETS NEW ALL-TIME MARK

WASHINGTON, May 26—April production of motor vehicles totalled 402,574 passenger cars and 53,268 trucks, of which 382,631 passenger cars and 50,272 trucks were made in the United States, and 19,943 passenger cars and 2,996 trucks in Canada, the Department of Commerce shows. This is the highest production ever recorded, according to the Department's figures.

The table below is based on figures received from 172 manufacturers for recent months, and presents a slight revision in the totals previously shown, due to the receipt of corrections in the original reports. Data for earlier months include 75 additional manufacturers now out of business, while April data for 15 small firms, mostly truck manufacturers, were not received in time for inclusion in this report.

	Cars	Trucks	Total
1925			
Jan.	213,851	28,202	242,053
Feb.	253,955	34,481	288,436
March	334,214	45.179	379,393
April	393,262	47,983	441,245
Total	1,195,282	155,845	1,351,127
May	384,548	45,718	430,266
June	366,510	38,150	404,660
July	360,124	41,870	401,994
Aug.	223,517	37,849	261,366
Sept.	274,227	60,482	334,709
Oct.	408,017	46,012	454,029
Nov.	337,435	40,048	377,483
Dec.	286,141	34,487	320,628
Total	3,835,801	500,461	4,336,262
1926			
Jan.	284,153	32,735	316,888
Feb.	335,639	40,878	376,517
March	399,376	48,705	448,081
April	402,574	53,268	455,842
Total	1,421,742	175,586	1,597,328

Graham Records Continue

DETROIT, May 25—A total of 10,208 Graham Brothers trucks and motor coaches were delivered from Jan. 2 to May 15, by Dodge Brothers dealers in the United States, a gain of 4976 or 88 per cent over the corresponding period of 1925. Retail deliveries for the two weeks ending May 15, totaled 1364, a gain of 760 over the same period in 1925.

Total factory shipments of Graham Brothers trucks and motor coaches from Jan. 1 to May 15, 1926, were 13,022, a gain of 5027 over a year ago.

Edsel Ford Returning

DETROIT, May 27—Edsel Ford, who, with Mrs. Ford, left for a tour of Europe several weeks ago, will return to Detroit next week, it was reported here today.

I.C.C. Orders Probe of Rail, Motor Lines

Will Make Recommendations for Regulation Following Study of Competition

WASHINGTON, May 25—The growing competition of motor trucks and buses with railroads was recognized today by the Interstate Commerce Commission which ordered an extensive and sweeping investigation into the entire competitive structure of motor and rail transportation. The inquiry will embrace the legality and propriety of motor bus operation, rates and fares, and the extent to which the railroads have been affected by motor competition.

In making public its order for the inquiry, the commission said it was prompted to make the investigation because "the operation of motor buses and motor trucks by or in connection or competition with the railroads has been steadily increasing and is likely further to increase.

"The commission should be in possession of full information regarding the operation of motor buses and trucks operated by or in competition with the railroads, in order that it may intelligently make recommendations to Congress respecting the regulation of such carriers by motor buses and trucks."

The investigation is the most sweeping undertaking of the commission since the passage of the Hoch-Smith resolution adopted by Congress in January, 1925, requiring it to investigate the entire freight rate structure of the country. No dates for the hearings were set; these to be announced later. It was stated, however, that it is planned to hold the hearings at various places throughout the country.

Defer Gasoline Investigation

WASHINGTON, May 26—Efforts to force adoption of the Trammel resolution calling for an investigation of the rising price of gasoline, by the Federal Trade Commission, were blocked in the Senate today. By a vote of 37 to 29, the Senate voted against the investigation at this time. Despite the Senate's vote there were indications that it would be adopted ultimately, as a number of Senators who voted against taking it up now, announced that later on they would support the resolution.

Creditors Committee Takes Over Wayne Body

DETROIT, May 27—Creditors of the Wayne Body Corp. met today at the invitation of the company and adopted a plan whereby a committee of three creditors will direct the destinies of the company. Two hundred persons, representing interested concerns, attended. Action was taken to protect the creditors and to protect and continue the operation as usual of the Gotfredson Truck Corp., which, it was claimed has been operating at a profit, and to wind up the affairs of the body corporation whose losses have offset the truck company's earnings.

Walter L. Dunham, vice-president of the First National Bank of Detroit; C. W. Dickerson, vice-president, Timken Detroit Axle Co., and George Beisham, assistant treasurer Sidney Blumenthal & Co., New York, were elected to the committee. They will select a general manager to direct operation of the company.

Opinion was expressed by auditors that the body corporation could be liquidated without loss to creditors, and, if the company could cancel certain contracts and cease manufacturing operations at an early date, thereby minimizing further losses, that assets would probably leave a margin for stockholders, of whom Benjamin Gotfredson is the principal one.

Stutz Closed Car Wins Yosemite Cup

LOS ANGELES, May 26—The annual Yosemite economy run was featured by the first appearance in competition of the new Stutz eight, a sedan winning the special cup for the closed car making the best showing and coming in second in the grand sweepstakes, which was won by a Duesenberg sport touring. Mileage for the winner in this class was 19.86 miles per gallon with the second car making 16.75.

In the other classes, Star with a mileage of 29.09 won in the four cylinder division; Star with a mileage of 23.6 won in the six-cylinder, under $1000 division; Flint with a mileage of 25.48 won in the six-cylinder, $1000 to $2000 division; Franklin with 20 miles in the six-cylinder, $2000 and over division, and Duesenberg, winning the sweepstakes, also won in the eight-cylinder division.

The results outlined are tentative pending final check by American Automobile Association officials.

GMAC Names Managers in Three New Branches

NEW YORK, May 24—General Motors Acceptance Corp. has just opened new branches in Milwaukee and Louisville and will open in Des Moines soon. This expansion brings the total number of GMAC branches to 30 in the United States and three in Canada, with representation in all other parts of the world where General Motors cars are sold in any quantity.

The Milwaukee branch was opened in the Century Building with George H. Swift as manager. E. H. Hancock is manager of the Louisville branch in the Starke Building. The Des Moines branch opens June 1 in the Insurance Building under the management of G. H. Rhorer.

Booster Meeting Called

NEW YORK, May 25—A meeting of the International Board of Governors of the Automotive Booster Clubs has been called for the evening of June 14 at Mount Royal Hotel, Montreal by R. M. Sheridan, international president.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, May 27—Some improvement in retail trade and in crop conditions was noted last week. There was also a slight gain in the volume of wholesale trade. Industrial activity continued to recede slowly. The level of wholesale commodity prices advanced further, and stock quotations also displayed increased strength.

FREIGHT CAR LOADINGS

A further slight increase in railway freight car loadings occurred in the week ended May 8. During that week 996,527 cars were loaded, as against 995,641 in the preceding week and 983,034 in the corresponding period last year. Loadings since the beginning of the year number 17,773,603, which compares with 17,476,346 a year ago and 16,907,994 two years ago.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended May 19 were 4.7 per cent above the total for the preceding week and 4.5 per cent above that of a year ago.

FISHER'S INDEX

Fisher's index of wholesale commodity prices stood at 152.9 last week, as against 152.3 a week earlier and 151.2 four weeks earlier. Last week's figure was the highest since the third week of March.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve banks increased $13,400,000 during the week ended May 19. Discounts rose $13,400,000 and holdings of Government securities $2,400,000, while open market purchases declined $1,700,000. Note circulation decreased $10,300,000, while deposits gained $35,000,000 and reserves $10,200,000. The reserve ratio declined from 75.7 to 75.4 per cent.

Loans of reporting member banks declined $66,000,000 during the same period, the principal change being a decrease of $53,000,000 in "all other" (chiefly commercial) loans. Investments increased $29,000,000 and borrowings from the Federal Reserve banks $15,000,000, while net demand deposits declined $59,000,000 and time deposits $12,000,000.

Loans to brokers and dealers by reporting member banks in New York City declined from $2,480,280,000 to $2,408,695,000 during the week ended May 19.

MONEY

Call loan rates ranged from 3¾ to 4½ per cent last week, as against 3½ to 4 per cent a week earlier. Time loan rates were slightly higher at 4 to 4¼ per cent, while rates on commercial paper were lower at 3¾ to 4¼ per cent, which compares with 4 to 4½ per cent in the preceding week.

Steel Products Now Thompson Products

Title Changed to Identify Company More Closely With Leading Executive

CLEVELAND, May 25—Stockholders of Steel Products Co., have voted to change the name of the company to Thompson Products, Inc., to give the company greater individuality and to identify it more closely with C. E. Thompson, president, whose achievements and reputation in the industry it regards as having high asset value. The change also consolidates, under the Thompson name, manufacture for both the original equipment and replacement fields.

There will be no change in ownership, management, personnel or purpose incident to the change in name. Under the new title will be grouped the main plant of the Steel Products Co., Cleveland, the Detroit plant, and the Cleveland plant and facilities of a junior company, Thompson Products, Inc., which on its formation three years ago was given the name now adopted for the older company.

The Steel Products plants have been engaged in manufacture of parts exclusively for automotive vehicle builders, the junior company functioning as manufacturer for the replacement trade. In consolidating these activities, the company seeks to make available for the two fields simultaneously any improvements in its products which may be developed.

The company now serves 65 to 70 leading manufacturers in the automotive, airplane and allied industries, and it is distributing its parts for replacement through a country-wide wholesale organization. The company reports also a growing volume of export business both from manufacturers and from the replacement trade.

Several changes in titles of officers are made coincident with the change in the company name, the new listing being as follows: C. E. Thompson, president; W. D. Bartlett, senior vice-president; C. W. Miller, vice-president and general manager; E. G. Thompson, vice-president and manager of the replacement division; F. C. Crawford, vice-president and manager of the Michigan plant; J. A. Krider, treasurer, and W. M. Albaugh, secretary. These officials with S. L. Mather, C. N. Osborne, A. A. Stearns and F. S. Borton constitute the board of directors.

Timken Bearing Expands to Build for Railways

CANTON, OHIO, May 22—Plans to manufacture bearings for railroad equipment, constituting a revolutionary step in the transportation industry and involving an expenditure of more than $1,500,000 in expansion, were made public by the Timken Roller Bearing Co. this week. The site of the new plant is adjacent to the present factories of the Timken company. Work will be started immediately on the project and the new factory expansion will be ready by Jan. 1 next year.

The expansion became necessary because of the rapidly increasing adoption of Timken bearings in general industry and to provide the initial facilities for the manufacture of bearings suitable for railroad equipment. Bearings also are to be made for oil drilling and pumping machinery, gas railway cars, conveyors, household appliances, electric railway motors, road building machinery, mine cars, steel mill equipment and ceramic machinery.

Sale of Lexington Ordered by Court

INDIANAPOLIS, May 24—The assets of the Lexington Motor Co. of Connersville, Ind., are to be ordered sold according to a ruling in United States District Court here. June 11 is set as the date when priority liens against the company property will be filed and the property ordered sold. This is the net result of several court moves here following the request of the former receiver, W. P. Herod, for a court order to sell the assets.

Complaint against his desire to sell the property was made, and Mr. Herod resigned. A new receiver was appointed and a new hearing on the matter was heard yesterday at which different sets of creditors and holders of receiver's certificates both contended for priority of liens. The chief question at issue was as to priority raised both by merchandise creditors and holders of receiver's certificates. There was also a question as to whether the attempt to conduct the business under court order some time ago as a going concern was entirely correct. It had been understood that more than a year ago such court orders were issued and an attempt made to work up and match the inventory.

For a time the concern apparently got partly on its feet but later the sales fell off and production work was stopped. During the last year several attempts to unscramble the mixed affairs of the concern have been made without success, and the forecoming sale will doubtless wind up the affairs of the concern as a motor car manufacturer.

Stutz Speeds Inventory

INDIANAPOLIS, May 25—Inventory turnover of Stutz Motor Car Co. of America, Inc., is now at the rate of 38 times a year, according to E. S. Gorrell, vice-president. This compares with a January rate of six and one-half times annually, February, 16 and March, 24.

Navy to Open Plane Bids

WASHINGTON, May 25—The Navy Department will open bids on June 6 for 100 bombing planes to be used on the new airplane carriers Saratoga and Lexington. The total cost will be approximately $2,225,000.

Hudson Stock Covers Company Expansion

With Building Program Completed, New Earning Assets Will be Capitalized

DETROIT, May 25—Payment of the 20 per cent stock dividend authorized by Hudson Motor Car Co. directors last week will increase the outstanding shares of the company to a total of 1,596,060 on which it will pay $3.50 a share annually under the increased dividend rate, or a total yearly dividend payment of $5,586,210. Net income of the company in 1925 was $21,378,504. For 1924, 1923 and 1922 it was $8,073,459, $8,003,624, $7,242,677 respectively. After payment of the stock dividend, which will carry the increased cash dividend, there will remain 403,940 authorized shares unissued.

On the basis of the when issued valuation, the company is distributing approximately $5,320,000 in stock, which according to R. B. Jackson, president, represents the capitalization of a further portion of the increase in plant assets since 1924. The present market valuation of the new stock is approximately $17,300,000.

With the declaration of the dividend, Mr. Jackson said further that the company's building program had been completed and paid for entirely out of earnings. It will be the policy of the directors, he said, to issue stock dividends from time to time until all such increase of earning assets shall have been properly capitalized.

Since 1924 Hudson has made a number of important plant purchases and also has extensively increased its former plant structures and is now completing its new body factories. The plant purchases included those of the former Jefferson Forge company and the Clayton Lambert property. Early in 1925 it started the erection of a new main manufacturing building which was completed in time to participate in part of the 1925 production schedule. Erection of the body plant began midway in 1925.

Body Plant Soon to Operate

Operation of the body plant will figure in the later production of the present year. The company has made no official statement as to what classes of bodies it will build here or the percentage of its total body requirements that it will build, but the extent of the plant indicates a very large activity. The company has been building its sedan bodies in the Amesbury, Mass., plant, which it controls, but its production of this type car has been held low in the past largely because of inadequate body facilities at Amesbury.

As an indication of the extent of the new body operations, the company placed an order for presses with the Bliss Co., which alone approximated $1,000,000. Similar large expenditures for equipment were made in the other plants.

April Decline Noted in Report on Parts

Lower May Car Production Indicated But Step-up Seen for June

NEW YORK, May 24—April shipments of original equipment and replacement parts declined from March but shipments of accessories and service equipment increased, according to the monthly report of the Motor and Accessory Manufacturers Association.

Using January, 1925, as an index basis of 100, original equipment shipments in April were 160 compared with 182 in March, 160 in February and 137 in January, while replacement parts shipments were 141 compared with 146 in March.

April shipments of accessories stood at 176 against 167 in March, and service equipment shipments increased from 205 to 208. The figure representing total parts, accessories and equipment business for April was 161, comparing with 176 in March, and general business declined from 120 to 112.

The April decline in original equipment and replacement parts shipments should be regarded in connection with shipments throughout the first quarter, which were on a tremendous scale. Although a fall-off in May car production is indicated, an increase in orders for original equipment is expected to meet certain step-ups in car production anticipated in June.

Reports from Motor and Accessory Manufacturers Association members say that business is continuing on a good level. Unless some unforeseen circumstances arise, a comfortable summer and a good year as a whole are expected.

Velie Motors to Start Manufacture of Bodies

MOLINE, May 25—Decision has been reached by Velie Motors Corp. to manufacture bodies at the home plant instead of purchasing them from outside establishments. Production has averaged 30 cars a day this year and considerable overtime has been necessary to keep up with orders.

Material and machinery for the new body manufacturing unit have been ordered and production is looked for by July 1. Axles, formerly manufactured at Marion, Ind., are now being made here. As a result of these moves, the company has become practically a self contained unit, manufacturing within its own plant practically all of the important parts entering in the production of cars.

Oneida Truck Active

GREEN BAY, WIS., May 22—Oneida Mfg. Co. is building a full line of heavy-duty motor trucks and is launching special merchandising effort. All-steel driver cabs and complete electrical equipment has been added to the standard equipment.

RENT-CAR CONCERNS MUST COVER RENTER

MILWAUKEE, May 22—Concerns renting passenger cars for public use in Wisconsin have been notified by the State insurance commissioner that they are required by a law enacted by the 1925 Legislature to carry liability insurance covering the renter, and that it is unlawful for them to collect an insurance premium from the renter. The law is mandatory and makes necessary a public liability policy issued on a car to a company or a person doing a rent-a-car business which contains a clause covering the person who rents the car. Coupon or certificate plans for selling the renter insurance are illegal unless the operator of the business should be a regularly licensed agent for a licensed insurance company.

Repossessed Car Ads Breed Bargain Idea

CHICAGO, May 26—Glutting of the used car market by finance companies with repossessed cars was the subject of a statement sent to all automobile finance companies, bankers, dealers and manufacturers by C. C. Hanch, secretary and general manager of the National Association of Finance Companies. Mr. Hanch holds that the dealer is not without fault in the situation, and that cooperation between the dealer and the finance company to prevent instalment sales of automobiles on unsound credit terms is the only cure.

Such cooperation, Mr. Hanch believes, will effect these desirable results:

Repossession will not be excessive and finance companies will not be compelled to extend themselves in selling repossessed cars.

Dealers with entire propriety can insist that finance companies do nothing unnecessarily to hamper the dealer in his regular business.

Dealers also with consistency may ask finance companies not to advertise repossessed cars as such.

"In this connection," says Mr. Hanch, "dealers believe that advertising such cars as repossessed cars does not appreciably aid in selling them. Other original and attractive advertising can be devised which will be equally effective, if not more so. It is not doing the automobile selling or financing business any good to foster the idea among local buyers that there is an exorbitant number of repossessed cars on hand which may be bought at ridiculously low prices."

Renold Assumes Sales

NEW YORK, May 27—Renold silent timing chains, heretofore marketed indirectly, are now being marketed direct to the jobbing trade by the maker, Hans Renold, Inc., 365 Broadway. W. F. Meyer has been placed in charge of distribution in the timing chain division.

May Tire Shipments Exceed Production

Buying by Dealers Continues on Limited Basis—Rubber Purchasing Inactive

NEW YORK, May 24—Henderson, Helm & Co., Inc., in its weekly review of the rubber market, finds improvement in the tire situation, despite the fact that good weather has not been sufficient to cause any great stimulus to public buying of tires.

Reports from the larger factories indicate shipments exceeding production so far this month. If this continues, the review says, it will not be long before the surplus of tires will be taken up. The review continues:

"The tire dealer seems to have the attitude that 'I am protected on prices to July 1 and why should I buy tires at present unless I get orders from the public? The weather has produced a surplus of tires and I will let the manufacturer carry the bag meantime.'

"Now that summer is so near, tire buying in volume is inevitable and while manufacturers have been compelled to slow up output somewhat it is only a sane policy of adjustment to meet the situation."

Department of Commerce figures of April rubber arrivals are about 2400 tons higher than the Rubber Association figures. For the first four months this year the department reports arrivals of 153,627 tons and the association 148,119 tons. Arrivals so far in May are 26,593 tons, and it would appear that arrivals will more than equal consumption.

The market on the Rubber Exchange during the past week continued its sagging tendency and, barring a few temporary reactions, the trend was generally downward. This is due to the continued absence of manufacturing demands.

Chrysler May Production Will Approximate 15,000

NEW YORK, May 24—Walter P. Chrysler, president of the Chrysler Corp., says the May production schedule calls for 8500 of the new "60" models, with plans to increasing the output to 11,000 in June. Current production on the new model is averaging 350 a day and total May production, including the other models, will be around 15,000 cars.

Declaring that there is no indication of a falling off in Chrysler business, Mr. Chrysler believes that the greatest danger to the business situation now is pessimism, which overlooks the sound basis on which the automotive industry is founded.

He finds that thus far pessimistic talk has not materially affected business, particularly the automobile business, but he admits that it has served a purpose in applying the brakes to excesses that were obvious in land and stock market speculation. He feels that too much pessimism is likely to disturb confidence in business and curtail buying power.

GM Overseas Sales Near 12% of Total

NEW YORK, May 25—General Motors sales to overseas dealers in the first quarter this year totalled 31,936 cars, compared with 15,577 and 17,266 in the corresponding quarters of 1925 and 1924, respectively. First quarter sales this year exceeded each quarter in 1924 and 1925 except the fourth quarter last year, when 33,134 cars were sold overseas.

Alfred P. Sloan, Jr., president, says that General Motors exports approximate 12 per cent of the total number of cars sold and at their present rate, will total about $100,000,000 wholesale value for 1926, compared with $77,109,696 in 1925, $50,929,322 in 1924, $39,193,869 in 1923 and $19,875,015 in 1922.

By wholesale value Mr. Sloan means the amount of money the corporation receives for the cars from its dealers. The retail value abroad would swell this amount materially.

Sales to overseas dealers in number of cars by quarters have been:

	No. Cars 1926	No. Cars 1925	No. Cars 1924
1st Quarter	31,936	15,577	17,266
2nd Quarter	....	26,277	16,690
3rd Quarter	....	25,906	14,209
4th Quarter	....	33,134	16,680

Last year General Motors total sales to dealers for the whole world were 835,902, of which 100,894 were overseas sales.

Following is a comparison of the past four years of total General Motors sales for the whole world:

Year Ended Dec. 31	Total No. Cars Sold	No. Sold Overseas	% Sales Overseas
1922	456,763	21,872	4.79%
1923	798,555	45,000	5.64%
1924	587,341	64,845	11.04%
1925	835,902	100,894	12.07%
1926 (1st Quarter)	280,986	31,936	11.37%

"Part of the cars sold overseas have been built in General Motors plants in the United States and Canada and the balance in overseas assembly plants," says Mr. Sloan.

"It is the policy of General Motors to make itself part of the business activity of each particular country as far as possible and for that reason we establish at strategic points throughout the world assembly plants and subsidiary corporations for more economic distribution and for the purpose of better meeting local overseas conditions. Merchandising or assembly operations are now being conducted in London, Copenhagen, Antwerp, Buenos Aires, Sao Paulo, Malaga and Bilbao, Spain; Hamburg, Le Havre, Port Elizabeth, South Africa and Wellington, New Zealand."

New Jersey 1926 Market Takes 44% More Cars

NEW YORK, May 24—In the eight southern and 13 northern counties of New Jersey during April, 14,361 new passenger cars were sold, according to Sherlock & Arnold. This was a gain of 4052 or 39 per cent over the total for March this year, and of 5459 or 61 per cent over April last year.

During the first four months this year a total of 37,364 new passenger cars were sold, compared with 25,946 in the first four months last year, a gain of 11,418 or 44 per cent.

Monthly sales so far this year, compared with 1925, are:

	1926	1925
January	8,806	6,231
February	3,888	4,012
March	10,309	6,801
April	14,361	8,902

Rickenbacker Cuts Prices

DETROIT, May 22—Price reductions on three of the 6-cylinder models, have been made by the Rickenbacker Motor Co. Prices of all 8-cylinder models remain unchanged.

The 5-passenger coupe sedan is reduced $200 from $1695 to $1495. The 5-passenger brougham is cut $100 from $1875 to $1775 and the 5-passenger sedan is reduced $100 from $2095 to $1995.

Coach Company Buys New York Rail Line

NEW YORK, May 24—Control of the New York Railways Corp. has been purchased by the Fifth Avenue Coach Co., according to Hugh J. Sheeran, president of the former.

Preceding this purchase, which must be approved by the Transit Commission, the control of the Fifth Avenue Coach Co., operating the Fifth Avenue bus system, passed from a group of Chicago men, including John Hertz, chairman of the board of the Yellow Truck & Coach Mfg. Co., to a New York group which includes John A. Ritchie, president of the Yellow Truck organization. The New York interests are in control of the Omnibus Corp., which controls the New York Transportation Co., which in turn owns all the stock of the Fifth Avenue Coach Co.

Control of the New York Railways Corp., which operates many important trolley lines in Manhattan, by the Fifth Avenue Coach Co., is believed to strengthen the position of these concerns in their application to the State authorities for a franchise to operate a bus system throughout Manhattan. The trolley concern is willing to surrender the perpetual franchise to some or all of its lines for bus franchises and to tear up its tracks on certain streets and avenues and substitute buses.

The transaction was made possible by a bill enacted by the recent legislature authorizing bus companies, with approval of the commission, to purchase more than 10 per cent of the stock of street railway companies.

The new interests in control of the Fifth Avenue Coach Co. include David A. Schulte, J. & N. Seligman, Charles H. Sabin of the Guaranty Trust Co., W. A. Harriman & Co., Elmer Schlesinger, of counsel for the company, Grayson M-P. Murphy, Harry Bronner and Mr. Ritchie.

Developments of the Week in Leading Motor Stocks

NEW YORK, May 27—There were several constructive developments of a financial nature affecting the motor shares last week, but notwithstanding a fairly brisk rally in other sections of the stock market, the motor issues were unaffected by the good news. At the end of the week prices, with one or two exceptions, were about where they were at the beginning, and the failure of the group to respond to the news merely served to confirm Wall Street bears in their opinion that the trend was still down.

The most important development last week was the stock dividend and increase in the cash rate on Hudson Motors. In effect the action of directors was to increase the dividend from $3 a year to a $4.20 a year basis. This is not considered a sufficiently large dividend to justify present quotations of around $60 for the shares with other motors selling on a basis to yield 10 per cent or better.

Pierce-Arrow preferred registered a good gain for the week on prospects that directors early in June will take action to restore the $8 annual dividend. This would be the first dividend on Pierce preferred since 1921. As the stock is cumulative the arrears amount to $4,000,000 or $40 a share, but even if the dividend is restored, it is not expected that any steps toward liquidating the arrears will be taken in the near future.

General Motors sold ex the $5.75 dividend, constituting the recent declaration of the regular $1.75 quarterly and $4 extra. On this basis at 122 it showed a slight gain.

Yellow Truck & Coach receded to around 20 on announcement that additional stock was to be offered at this price for subscription by stockholders and that General Motors, which now holds control of the company, had agreed to underwrite the issue without commission. As a long pull prospect, some brokers believe Yellow Truck has good possibilities. Although selling on a relatively high yield basis on its dividend of 75 cents a year, the company has apparently entered on a big expansion policy in which it will be backed by General Motors. The willingness of the latter corporation to turn over $14,000,000 cash for this purpose indicates that important developments are pending and that General Motors sees unusual possibilities in the company's future.

The rubber and accessory shares, like the motors, showed little price change during the week.—E. S.

Steel Price Policy May Undergo Change

Contrasting Opinions of Gary and Schwab Seen as Indicating Fluctuation

NEW YORK, May 27—No sharper contrast in opinion could have been presented than was apparent in recent "keynote" addresses by the steel industry's two recognized spokesmen, Judge E. H. Gary and Charles M. Schwab, the former speaking before the American Iron and Steel Institute and the latter before the independent sheet steel manufacturers. Judge Gary painted a most reassuring picture of present steel market conditions and of the outlook.

Mr. Schwab said that, if he controlled the entire steel industry of the United States and the management could show no better returns on the capital invested than 4 per cent, as is at present the case, he would change the management. "The steel industry," he said, "is steadily exhausting its unreplaceable raw materials—virtually giving them away in not getting a fair return on the investment."

Obviously the Corporation's management considers prevailing steel prices, while modest by comparison with some of the "seven fat years" period, not in the least discouraging, and just as obviously the leading independent looks upon present-day steel prices as wholly inadequate. In fact, President Eugene Grace never loses an opportunity to voice this view as his solemn conviction.

From all of this the conclusion may be drawn that the price policy of the leading interest, which has always been predicated on a desire to stabilize the market over as long a period as possible, may ere long be subjected to the acid test of intensive competition from those producers who believe in "making hay while the sun shines" and pruning prices when the demand melts away.

Prices for automotive steel requirements show little change. There are unverified rumors of quotations of $1 a ton below the 4.30 cents level for full-finished automobile sheets, and of some slight concessions under the 3.75 cents, Pittsburgh, quotation for cold-rolled steel. Some descriptions of automotive alloy steels are reported to be a shade easier, especially so S.A.E. No. 6, 100 and nickel-chrome-vanadium bars.

Pig Iron—Sales of a few round tonnages to automotive foundries are reported, but, on the whole, melters are holding off, believing that the market has not yet reached bottom.

Aluminum—Imports continue in good volume, but importers say that nearly all of this metal is earmarked against standing contracts. Automotive consumers wanting to fill in, experience little difficulty in uncovering suitable lots. All business, however, appears to pass at the domestic producer's price. Latest reports from Canada say that work on the additional plant being built by the domestic producer on the Saguenay River is making rapid headway.

Copper—Anticipation of somewhat higher freight rates on copper about the middle of June causes some consumers to buy slightly more liberally. The Western Union is reported to be in the market for 2000 tons "at a price."

Tin—The Whitsuntide holiday in London on Monday caused a slowing down of market activities. The tone of the market is fairly easy.

Lead—Storage battery demand is light. The market is easy.

To Air Time Sales at N.A.C.C. Meeting

NEW YORK, May 25—At the annual members' meeting of the National Automobile Chamber of Commerce on June 3 two of the important topics will be time payments and foreign trade.

An effort will be made to determine how much real ground there may be for the frequent attacks upon time payments from outside the industry. The degree to which, as opponents of the system say, the future is being mortgaged by time payments will be studied, and there will be careful consideration of the manner in which credit extension is working out—whether last year's extremely low record of credit losses is holding good this year or whether the number and proportion of repossessed cars is increasing. The comparative merits of the recourse and non-recourse financing methods will also be discussed.

In discussing foreign trade the N. A. C. C. members are expected to decide where and when the next regional congresses are to be held and may change the date of the next World Motor Transport Congress. This has been fixed tentatively for New York show week, Jan. 8-15, but attendance so early in January requires many foreign delegates to leave their homes before Christmas.

The members will arrange the Chamber budget for the year, officers will be elected and the appointment of committees arranged for.

The directors, truck committee and the electric truck committee of the Chamber will meet on June 2 and the truck members' meeting will be held on the afternoon of June 3, the passenger car members opening their meeting in the morning.

Indiana Changes Stock to Provide New Funds

MARION, IND., May 28—Stockholders of Indiana Truck Corp. have authorized changing the capital stock structure of the company to provide for 37,500 shares of class A preferred stock, par value $25, and 75,000 shares of common stock, no par value. Holders of the present preferred are being offered an exchange of four shares of the new stock for one share of the former preferred of $100 par value. About half of the issue is thus provided for, the remainder being underwritten and purchased by the Fletcher American Co. of Indianapolis.

Financial Notes

Hood Rubber Co. sales for the year ended March 31 were $38,592,751 against $29,096,635 in the previous year. Total assets as of March 31 were $34,463,583, compared with $24,662,580 in the previous year, and profit and loss surplus of $3,429,920 was a gain of $1,376,803.

F. C. Hood, president, says that while first quarter sales this year were below company expectations they exceeded the first quarter last year. He sees every reason to believe that sales will increase in the present twelve months over the last fiscal year, and the company has many more orders on hand and many more active accounts than last year at this time.

Borg & Beck Co. has declared quarterly dividends of 75 cents compared with 50 cents quarterly and 25 cents extra in the two previous quarters. This places the stock on a straight $3 annual basis. The dividend is payable July 1 to stock of record June 18. During the first four months this year net profit was $298,739 after charges and taxes, equal to $2.39 per share on 125,000 shares of common, against $176,570 in the same period last year.

The Yellow Truck & Coach Mfg. Corp. has notified the New York Stock Exchange of a proposed increase in its common stock from 1,000,000 shares to 1,700,000; increase in class B stock from 600,000 to 1,300,000 shares, and increase in preferred stock from 200,000 to 300,000 shares. The company has declared regular quarterly dividend of 18 cents on Class B and $1.75 on preferred, both payable July 1 to stock of record June 19.

Moto-Meter Co., Inc., and subsidiaries for April reports net income of $278,000 after depreciation, Federal taxes, etc., compared with $233,508 in April last year. For the first four months this year, net income approximated $800,000. Cash on hand April 30 was $1,300,000 against $282,000 on the same date last year.

Splitdorf Bethlehem Electrical Company subsidiaries for the four months ended April 30 report operating profit of $157,051. Net profit, after depreciation and Federal taxes, was $95,194 or $1.42 a share earned on the 67,000 no par value shares of stock.

Goodyear Tire & Rubber Co. has declared regular quarterly dividends of $1.75 on preferred and $2 on prior preference stock. The former is payable July 1 to stock of record June 1, and the latter July 1 to stock of record June 15.

Willys May Earnings to Exceed $2,500,000

TOLEDO, May 26—Willys-Overland Co. earnings for April, before taxes, amounted to $2,112,185, exceeding highest estimates by more than $100,000. Daily production is exceeding 1000, John N. Willys, president, declared, of which 400 are Willys-Knight models. Retail sales continue ahead of production and May earnings will exceed $2,500,000, he said.

Canadian Tariff Change Fixes 30% on Bodies, Wheels and Tops

Parts Not Manufactured in Canada Placed on Free List Subject to Removal as Plants are Established —Drawback Extended

OTTAWA, ONT., May 24—Although Hon. J. A. Robb repeatedly stated in the House of Commons some days ago in reply to questions from the Right Hon. Arthur Meighen, leader of the Opposition, that he would make no substantial changes in the motor car tariff as announced in the budget, he has submitted modifications that are by no means insignificant. Representations made by Canadian manufacturers of bodies, wheels and tops for motor cars, have influenced the Minister of Finance, and these have been taken out of the tariff items covering completed cars, in which they have previously been included.

Those for cars of a value of $1200 or under were to pay 20 per cent, and those for higher priced cars, 27½ per cent. The change made by Mr. Robb today places the duty on all tops, wheels and bodies at 30 per cent. Chassis remain under the same duties as those on the completed cars. The 25 per cent drawback will apply to wheels, tops, bodies and chassis, where 50 per cent of the finished article is of Canadian production. This meets in some measure one of the objections of the manufacturers of these major parts. The other principal changes made in the motor car tariff is the placing on the free list of a large number of parts not now made in Canada. The duties on these parts has ranged from 27½ to 30 per cent. When any of these parts come to be made in Canada they will be removed from the free list. These parts include the following:

List of Items Duty Free

Horns, distributors, ammeters, board lamps, oil gages, gasoline gages, thermostats, oil filters, carburetors, purifiers for oil, purifiers for air, clocks, monograms of metal and enamel, annular ball bearings and parts thereof, lock washers, speedometers and parts thereof, vacuum tanks, gaskets of copper and of asbestos, rims for steering wheels, welded axle housings, electric terminals other than battery terminals and fuses.

It is specified that the duty should be on the retail price of the car when new. The effect of this is that in the case of second-hand cars imported from the United States the duty will be levied under the price classification of the same car when new. Thus a second-hand car that costs $700 in the United States and the original price of which was $1400 would pay duty at the rate of 27½ per cent. Sir Henry Drayton and other Conservatives endeavored to get from the Minister some estimate of the net protection enjoyed by the motor car manufacturers but they did not succeed. Hon. George Boivin, Minister of Customs, estimated that the protection had been as much as 10 per cent, in excess of the old duty of 35 per cent, one of the reasons being that motor car manufacturers sent their cars from the United States to distributors here at prices much below the list prices. The Canadian distributor paid on the lower price, but when he came to compute the price at which he would sell the car in Canada, he added the amount of the tariff duty as if it had been paid in the list price.

High Prices Hurt Exports

Opposition members retorted that the Minister of Customs was dealing only with one particular car that was not made in Canada at all. They protested that this estimate of the net protection did not apply to Canadian manufacturers. Mr. Robb maintained that the motor car companies were taking advantage of Canada's trade arrangements with other countries by producing in Canada for export. He pointed out, however, that they were injuring themselves in the Australian and New Zealand market by keeping up the prices in this country. Australia and New Zealand reckoned their tariff duties on the fair market value of the car in the country of origin, and the difference between prices in Canada and those in the United States destroyed the benefit they would have otherwise received by reason of the Canadian preferences in those Dominions.

He argued that the manufacturer would be assisted to larger business in those countries by being forced to lower prices at home. The object of the Government, Mr. Robb declared, was to compel the companies to cease being merely assemblers of cars in Canada and to produce at least 50 per cent of their vehicles in this country. He did not think they had a right to enjoy the Imperial Preference unless they did.

Until April 1 next the drawback will apply where 40 per cent of the finished article is produced in Canada. This is to give the manufacturers a chance to enjoy the drawback while increasing the amount of Canadian production.

Entries for Paris Show Higher Than Other Years

PARIS, May 8 (*by mail*)—American representation in the Paris automobile show, to be held in the Grand Palais, Oct. 7 to 17, will be the biggest on record, and will be in excess of that of any other foreign nation. The car manufacturing firms having secured stands on the main floor are Auburn, Buick, Cadillac, Chrysler, Chevrolet, Dodge, Ford, Hudson, Lincoln, Marmon, Oldsmobile, Overland, Oakland, Packard, Paige, Pierce Arrow, Pontiac, Rickenbacker, and Studebaker.

The entire Italian and Belgian industries will be represented; there will be a few firms from Austria, none from Germany, and Rolls Royce, Austin, Morris and Constantinesco from England. Following the passenger car show there will be a truck and commercial vehicle exhibition in the same hall from Oct. 23 to 31, in which the American firms will be Chevrolet, Dodge, Ford, Graham Brothers, Pierce Arrow, Studebaker and various General Motors.

Germany Confines Show to Domestic Cars Only

WASHINGTON, May 27—The Automotive Division of the Department of Commerce is advised that the 1926 German Automobile Show will take place in the exhibition grounds on the Kaiserdamm in Berlin, from Oct. 29 up to and including Nov. 7. Advices to the division further state that while the Reichaverband der Automobilindustrie originally intended to have an international show it has decided that the show shall remain purely German for the present year at least. The reason given is that the International Association whose headquarters are in Paris has not yet decided the question of German participation in foreign shows. This will not be decided until next winter and Germany in the meantime will not allow foreign cars to participate in the German show.

Insulator Duty 70 Per Cent

WASHINGTON, May 27—Imported spark plug insulators of printed vitrified ware are dutiable when entered through the Custom House at the rate of 70 per cent ad valorem under paragraph 212, Act of 1922, according to a decision by Judge Fischer of the Board of U. S. General Appraisers (Customs Trial Court), at New York. This decision overrules a protest of the Liberty Spark Plug Corp., of Boston, in which claim was made for duty at the rate of but 45 per cent ad valorem under paragraph 209 of the tariff law.

April Tax Collection Lower

WASHINGTON, May 27—Internal Revenue collections of automotive taxes for April, 1926, shows $272,703.42 for automobile trucks and automobile wagons as compared with $497,740.03 for April, 1925; $10,094,915.92 for other automobiles and motor cycles during April, 1926, as compared with $11,121,283.51 for April, 1925, and $962,854.52 for automobile parts and accessories for April, 1926, as compared with $1,620,927.49 for April, 1925.

Hamburg GM Plant Opens

NEW YORK, May 24—General Motors Export Co. has opened an assembly plant in the Free Port of Hamburg, to assemble Chevrolet trucks, at the rate of 50 a day, to supply the demand in Central and Eastern Europe. There are similar plants in Copenhagen and Antwerp.

Exports, Imports and Reimports of the Automotive Industry for April of current year and total for ten months ending April, 1926

	Month of April				Ten Months Ending April			
	1925		1926		1925		1926	
	Number	Value	Number	Value	Number	Value	Number	Value
EXPORTS								
Automobiles, parts and accessories (total)	..	$32,434,805	..	$32,992,813	..	$197,067,195	..	$279,839,110
Electric trucks and passenger cars	8	13,452	7	6,070	107	156,956	78	120,750
Motor trucks and buses, except electric:								
Up to 1 ton	3,907	1,705,799	6,511	2,988,589	20,890	8,711,774	48,069	20,952,654
Over 1 and up to 2½ tons	975	1,206,986	1,286	1,616,379	5,530	7,211,999	10,266	13,010,125
Over 2½ tons	145	460,887	240	710,115	1,251	3,430,193	1,725	5,382,182
Total motor trucks and buses, except electric	5,027	3,373,672	8,037	5,315,083	27,671	19,353,966	60,060	39,344,961
PASSENGER CARS								
Passenger cars, except electric:								
Value up to $500, inclusive	9,245	3,399,619	9,232	3,456,793	57,684	21,149,061	95,977	36,012,085
Value over $500 up to $800	5,591	4,005,062	6,527	4,454,098	37,577	26,634,617	51,772	36,362,510
Value over $800 up to $2000	..	..	..	..	22,761	26,749,809	..	..
Value over $800 up to $1200	6,314	6,558,620	5,762	6,110,717	19,157	20,034,487	51,430	54,362,364
Value over $1200 up to $2000	2,148	3,169,695	1,067	1,654,615	6,752	10,010,311	11,550	17,403,121
Value over $2000	508	1,397,906	564	1,533,062	3,451	9,591,330	4,359	11,941,413
Total passenger cars, except electric	23,806	18,530,902	23,152	17,209,285	147,382	114,169,615	215,088	156,081,493
PARTS, ETC.								
Parts, except engines and tires:								
Automobile unit assemblies	..	4,641,582	..	4,757,872	..	29,764,698	..	38,702,555
Automobile parts for replacement	..	2,792,418	..	3,204,801	..	19,440,431	..	26,364,684
Automobile accessories	..	728,743	..	904,116	..	5,675,859	..	7,860,676
Automobile service appliances (n.e.s.)	..	494,198	..	741,040	..	3,077,795	..	5,454,048
Station and warehouse motor trucks	52	16,466	16	15,801	197	114,845	113	97,048
Trailers	79	32,563	78	46,413	583	211,858	847	325,445
Airplanes	7	19,000	..	16,679	48	296,781	33	326,125
Parts of airplanes, except engines and tires	..	10,751	..	..	..	111,916	..	86,463
BICYCLES								
Bicycles and tricycles	976	20,915	667	18,294	6,616	163,297	5,483	155,504
Motor cycles	2,246	531,541	2,205	477,136	15,902	3,617,375	20,282	4,397,201
Parts and accessories, except tires	..	160,887	..	141,024	..	1,254,715	..	1,447,200
INTERNAL COMBUSTION ENGINES								
Stationary and portable:								
Diesel and Semi-Diesel	11	77,031	108	148,826	732	384,451	1,323	1,126,307
Other stationary and portable:								
Not over 10 H.P.	2,817	226,408	2,907	244,706	23,941	2,254,609	25,352	2,197,784
Over 10 H.P.	211	214,669	134	162,501	1,736	1,550,898	2,259	1,921,223
Automobile engines for:								
Motor trucks and buses	4,739	444,924	2,897	263,934	23,771	2,101,277	14,154	1,313,203
Passenger cars	18,344	1,909,112	15,077	1,331,652	53,529	6,404,393	99,706	10,056,788
Tractors	51	33,759	117	85,235	2,140	698,805	1,540	716,053
Aircraft	8	20,570	106	39,439	53	101,600	191	252,913
Accessories	..	317,895	..	428,499	..	2,796,974	..	3,434,181
IMPORTS								
Automobiles and chassis (dutiable)	49	109,642	67	132,119	438	746,373	638	943,871
Other vehicles and parts for them (dutiable)	..	61,045	..	20,782	..	586,627	..	482,398
REIMPORTS								
Automobiles (free from duty)	6	8,100	6	2,025	444	658,144	144	213,381

Ford Opens Offices in Latin America

NEW YORK, May 24—Plans were disclosed here today for the opening of two new supervisory sales offices of the Ford Motor Co. in Latin America. The first of these is at Caracas, Venezuela, and the second at San Juan, Porto Rico. The former office is already in operation and is in charge of George Jenkins, formerly of the Ford branch at Barcelona, Spain. The San Juan branch will be opened in June, in charge of W. W. Townsend, who is en route from Detroit.

Neither branch, as at present contemplated, will carry stocks and no changes will be made in the present distribution of Ford automobiles in the territories served. Distributors and dealers, however, will report to these branches, rather than to Detroit, as formerly, this being a step in the Ford program of decentralizing export authority.

According to the understanding here, the Caracas office will supervise sales in Venezuela, Colombia, Panama and Curacao. The San Juan branch will supervise sales in Porto Rico and the adjacent West Indian territories.

Complete Vera Cruz Road

WASHINGTON, May 22—Impetus to automobile sales in Mexico is forecast by the industry there, as the result of a contract just signed by the Federal government for 130 miles of highway which will connect Mexico with Vera Cruz, thus completing the complete link of 375 miles. In informing the Transportation Division of the U. S. Department of Commerce, of the awarding of the contract, the commercial attache at Mexico City says: "The highway will mean a greatly increased demand for passenger cars, trucks and tractors."

Franklin Works Out Plan for Small Dealerships

SYRACUSE, May 24—John W. Lee, merchandising manager of the Franklin Automobile Co., announces the appointment of three new district managers: D. S. Dider, Dallas district; F. C. VanDerhoof, Chicago district; and J. Elmo Green, Richmond district.

In accordance with the expansion plans recently announced, the company has increased the number of its sales districts, has worked out a proposition for small town dealers and intends to promote a more intensive coverage of territory everywhere.

Factory shipments during the first two weeks of May were 92 per cent ahead of the same period in April.

Gardner Exports Increase

ST. LOUIS, May 24—Between 40 and 50 per cent of all export shipments of Gardner Motor Co., Inc., are now closed models according to T. F. Fowler, manager of the export division of the company, this contrasting with an approximate 10 per cent until recently.

American Road Marks Unsuited for Europe

PARIS, May 12 (*by mail*)—As guest of honor at the monthly dinner of the American Automotive Club of Paris, E. W. James, chief of the Division of Design of the U. S. Bureau of Public Roads, outlined the results obtained at the recent diplomatic road conference just held in Paris, at which he was one of the American delegates.

The American system of road marking could not be adopted, European nations having decided that five signs, without any wording, was preferable on a Continent where forty languages were spoken. Mr. James considers, however, that while the present European system may be satisfactory while automobile registrations are light, more explicit marking will be required as the number of automobiles on the road increases in Europe.

Brake Control Satisfactory

Action taken by the Diplomatic Conference on brake control was entirely satisfactory to the United States, for it provides for two independent brake controls, thus admitting the modern four wheel braking system with one control by hand and another control by foot. Under the original proposals, as drawn up by the French, it was stipulated that there should be two entirely independent sets of brakes.

Men of the Industry and What They Are Doing

Factory Men Help Lay Out Carnegie Service Course

Carnegie Institute of Technology has made available a four-year college course in automotive service management in its College of Industries and will confer bachelor of science degrees upon graduates. In outlining the course the college has followed advice sought from executives in practically all leading automobile plants.

Among those who have assisted are H. A. Cobleigh, secretary of service, National Automobile Chamber of Commerce; F. J. Leyerle, service manager, Franklin Automobile Co.; F. A. Bonham, general manager of parts and service division, Durant Motors, Inc.; R. C. Reichel, service manager, Chrysler Motor Sales Corp.; T. H. White, vice-president, White Motor Co.; L. C. Josephs, Jr., International Motor Co.; F. J. Wells, service manager, Pierce-Arrow Motor Car Co.; S. V. Norton, general service manager, General Motors Truck Co., and T. A. Stalker, technical service department, Packard Motor Car Co.

Hawk Named Vice-president

Homer V. Hawk has been appointed vice-president in charge of sales in the automotive industry of A. T. Baker & Co., Inc., manufacturers of upholstery materials. Mr. Hawk has been identified with the industry since 1904 when he joined the Kinsey Mfg. Co., later becoming general purchasing agent for Willys-Overland, Inc., when it absorbed the Kinsey company in 1914. Mr. Hawk's headquarters will be in Toledo.

Haresnape Heads Contest Board

Val Haresnape, of Los Angeles, nationally known racing expert, has been named manager of the Contest Board of the American Automobile Association, the appointment to take effect immediately. He has for the past two years been a member of the board, representing the Pacific Coast.

Phelps, Inc., in New Home

DETROIT, May 22—George Harrison Phelps, Inc., has just moved into its beautiful new building at East Jefferson and Joseph Campau Avenues. The structure, an adaption of Italian Renaissance architecture and unique in character, was planned and created for the exclusive use of a national advertising organization. W. G. H. P., the Phelps radio broadcasting station, remains in the former building on Rowena Street.

Joseph Signs Moon Line

ST. LOUIS, May 25—Distribution of Moon and Diana cars in the British West Indies and British Guiana will be handled by the Moon Motor Car Sales & Service Agency, at Port of Spain, Trinidad, the director of which is Andrew Joseph.

LEE EASTMAN HEADS B'DWAY ASSOCIATION

Lee J. Eastman, president of the Packard Motor Car Co. of New York, has been elected president of the Broadway Association. This is the first time that the association has chosen an automobile man as president.

Mr. Eastman has been a consistent leader in the work of improving conditions relating to the industry. He was a strong advocate of Federal motor excise tax abolition and is a recognized authority on the improvement of traffic measures and the good roads movement. For two years he was the chief executive of the Automobile Merchants Association, and he has served on a number of highway committees. His new office presents him with an opportunity to broaden his influence among New York industrial leaders.

Australian Agent Here

George H. Sample, of Sample & Wilson Pty. Co., Ltd., manufacturers' agent in Australia and New Zealand, will be in New York City during July and August with headquarters at the office of Arkell & Douglas, Inc., 73 Pearl street. This concern has offices in Melbourne, Victoria, and Sidney, New South Wales.

Moore Underwriter Manager

J. Ross Moore has been appointed manager of the National Automobile Underwriter's Conference, succeeding Howard De Mott whose term expired October 1. Until a new manager can be secured for the Eastern Automobile Underwriter's Conference, Mr. Moore will also supervise the work of that office.

Skinner Holley Manager

G. Ford Skinner has been appointed district sales manager in charge of the central north and southwestern districts of the United States for Holley Carburetor Co. He will maintain headquarters in the Interstate Building, Kansas City, Mo.

Cunningham With Eisemann

Dr. R. H. Cunningham has joined the engineering staff of the Eisemann Magneto Corp. Dr. Cunningham is widely known in the industry, being connected with it since its early days except for a period from 1917 to 1919 when he occupied a post at Columbia University.

Coast May Meeting Held

SAN FRANCISCO, May 24 — The principal paper presented at the May meeting of the San Francisco section of the Society of Automotive Engineers, was by Prof. A. B. Domonoske.

Harvester President Finds European Plants Active

Alexander Legge, president of the International Harvester Co., has returned from Europe, where he visited that concern's plants in England, France and Germany, finding all of them running practically at capacity.

From present indications he expects International Harvester to have as good a year in 1926 as it did in 1925. "From what I understand," he said, "we shall have good crops in the United States this year and the farmers should buy well from us. Our bus business is showing a gain over last year."

Sonneborn Buys Out Partner

Herman Sonneborn, president and general manager of Maas & Sonneborn, Inc., exporters of automotive equipment, New York, has taken over his partner's interest in the organization. The present name will be retained. Two field representatives to travel Europe and the Far East and Latin America, will soon be appointed.

Krohn Visits Europe

Henry Krohn, vice-president of the Paige-Detroit Motor Car Co. in charge of sales, sailed on the Leviathan to make an intensive study of European conditions affecting sales of Paige and Jewett cars. His tour will include England, Holland, Belgium, France, Spain, Germany, and Sweden.

Two Wills Officers Retire

Charles F. Boos has succeeded W. J. Parrish as general sales manager of Wills Ste. Claire, Inc., following Mr. Parrish's resignation. A. E. Northrup, body designer for the company has also resigned, no successor having been named.

Sheridan Sells Victor Lamp

Richard M. Sheridan of Chicago, will represent the Victor line of automotive lamps and equipment in the middle western territory. His headquarters will be in Chicago and two salesmen will assist him.

Fisher Gets Hole-in-One

Albert Fisher, president of Standard Motor Truck Co., has joined the hole-in-one club, achieving this honor while playing in a Detroit foursome at French Lick Springs on a 105-yard drive uphill.

"Styleader," Winning Title

MOLINE, ILL., May 26 — "Velie Styleader" is the name that has been selected for the new and hitherto unchristened Velie sedan model of custom design. The name was chosen after a nation-wide contest in which more than 200,000 suggestions were submitted. The winner was turned in by Mrs. Henry Leibrandt, Watsonville, Calif. Her reward is a Velie car.

New York Deliveries Show 43% Increase

Four Months' Business in Territory Gains 10,714 Over 1925 Period

NEW YORK, May 24—A total of 17,795 new passenger automobiles are credited to April sales in the Metropolitan territory. The April total is a gain of 5415 or 43 per cent over April, 1925, and a gain of 5505 or 44 per cent over March this year.

The territory represented by these figures covers the five boroughs in New York City, the remainder of Long Island and the adjacent counties of Putnam, Rockland and Westchester.

During the first four months this year, 40,222 new passenger vehicles were sold. This was a gain of 10,714 or 36 per cent over the first four months in 1925.

Sales of higher priced cars in April totalled 1802, a gain of 73 per cent over April last year, and sales of lower priced cars were 15,993 or a gain of 41 per cent over the same month in 1925.

The higher priced car sales during the first four months this year were 4110 and lower priced car sales 36,112, a percentage of 10.2 and 89.8, respectively. The percentage of higher priced car sales to total sales in the first four months last year was 9.5 against 7.6 and 10.2 in the corresponding periods of 1924 and 1923, respectively.

The following table compares high and low priced car sales so far this year with the same months last year:

	1926		1925	
	H.P.	L.P.	H.P.	L.P.
Jan.	761	6,012	415	2,453
Feb.	329	3,035	411	3,382
Mar.	1218	11,072	913	9,554
Apr.	1802	15,993	1,079	11,301
	4,110	36,112	2,818	26,690
Grand Total	40,222		29,508	

	1924		1923	
	H.P.	L.P.	H.P.	L.P.
Jan.	292	3,548	212	2,803
Feb.	357	3,814	606	2,775
Mar.	674	8,179	821	8,050
Apr.	972	12,133	1,180	11,050
	2,295	27,676	2,819	24,628
Grand Total	29,971		27,447	

British Tire Exports Drop

WASHINGTON, May 22—Exports of automobile casings from the United Kingdom to foreign countries during the first three months of 1926 numbered 191,095, a slight decline as compared to 198,022 in the first quarter of 1925.

Van Norman Sales Change

CLEVELAND, May 26—The sale of Van Norman valve refacers, reseating cutters, valve seat grinding stones and other electric drill equipment is now being directed by the Van Dorn Electric Tool Co., along with its electric drills and grinders.

ROLLS-ROYCE SALES CONTINUE UPWARD

NEW YORK, May 24—Rolls-Royce sales in the United States during the first quarter were 43 per cent greater than during the same period last year, according to Henry J. Fuller, president of Rolls-Royce of America. He adds that the April sales more than maintained the high average previously established.

Mr. Fuller recently visited the Derby and London works of the British company. He was producing 30 cars a week and selling 24 in England, despite the heavy economic pressure existing both in England and on the continent.

Milwaukee Market Finds Sales Steady

MILWAUKEE, May 22—New car sales in Wisconsin during April were 4318 in excess of March and 730 more than in April, 1925, according to figures just released by the secretary of state. The total sales of passenger cars in the past month were 11,479, against 7161 in March, and 10,749 in April, 1925. Sales so far in May have been somewhat beyond conservative expectations and it is confidently believed they will show a similar percentage of increase over May last year, when 13,238 cars were sold.

The largest Milwaukee bank, in its monthly comment on local conditions says: "Automobile sales in Milwaukee appear to have exceeded last spring's sales to date. Dealers in the leading makes of passenger cars report that they are well sold up on new cars."

The industrial importance of Milwaukee as a center of the automotive unit and parts industry, the report says, has benefited greatly by the favorable reaction to the high rate of automobile sales and output.

Kokomo Company Builds

KOKOMO, May 24—The Kokomo Automotive Mfg. Co. of this city has started construction on a new factory building costing $50,000, to which it will remove about Aug. 15. The new plant will provide double the space available in the present plant. This with new machinery designed by Neil T. Albright, president and general manager, and his staff, will double production facilities. Much of this machinery, it is said, will be entirely new to the mirror and glass industry.

Plan Ford Addition

MEMPHIS, May 24—A $250,000 addition to the Ford Motor Co. Riverside plant is contemplated, according to report here. The plant is working 1100 men five days a week, and this schedule will probably obtain the rest of May.

N.A.P.A. Now Selling 33 Lines of Parts

Organization Will Hold First Annual Convention in Detroit in June

DETROIT, May 24—Announcement of the annual convention of the National Automotive Parts Association at the Hotel Statler in Detroit, June 8 and 9, calls to mind the rather meteoric growth of this unique organization in the span of twelve months.

To date, the association has made arrangements with 33 well known manufacturers to distribute their parts exclusively or in part through the system of warehouses. The manufacturers are:

Advance Packing & Supply Co., sheet packing and gasket paper; Asbestos Textile Co., brake lining; Automotive Gear Works, Inc., ring gears, pinions, flywheel bands; Borg & Beck Co., clutch parts; Brown-Lipe Gear Co., transmissions; Cincinnati Ball Crank Co., bushings; City Brass Mfg. Co., bronze bushings; Cooper Clamp Co., radiator hose clamps; Continental Motors Corp., motors; Dayton Rubber Mfg. Co., fan belts; Diamond State Fibre Co., silent timing gears; Fitzgerald Mfg. Co., gaskets; Gas Engine Valve Co., valves; L. H. Gilmer Co., Ford transmission lining; Hide Leather & Belting Co., leather belting; F. L. Horton Corp., clutch facings; Laminated Shim Co., shims; Leesberg Machine & Mfg. Co., piston rings; Marlin-Rockwell Corp., ball bearings; Monmouth Products Co., bolts, clutch plates, bushings; Morse Chain Co., chains; The Oakes Co., fans; Pierce Governor Co., governors; Precision Products Co., piston pins; The Spencer Mfg. Co., axles; Spicer Mfg. Co., universal joints; L. Sonneborn Sons, Inc., Spicer grease; Timken-Detroit Axle Co., axles; Timken Roller Bearing Co., roller bearings; Warner Gear Co., transmission gears and differential cases; Wisconsin Machinery & Mfg. Co., pistons; The Victor Rubber Products Co., radiator hose, and the Toledo Steel Products Co., valves.

800 Feet Air Leviathan Goodyear Zeppelin Latest

WASHINGTON, May 22—Announcement that the Goodyear-Zeppelin Corp., of Akron, has completed plans for an 800-foot air leviathan was made here this week by the U. S. Bureau of Naval Aeronautics, which has been working with the builder on tentative plans.

Preliminary designing has been completed and work will start immediately, it is announced. The dirigible will be 185 feet in diameter and will have a capacity of 6,000,000 cu. ft., compared with the 3,500,000 of the Los Angeles. The ship will contain accommodations for 100 passengers in addition to the crew and have a cruising radius of 5000 to 8000 miles at a speed of 90 miles an hour.

Advance Sales Low in Hardwood Trade

ATLANTA, May 24—There has been a marked decline in the total sales of hardwood to the automobile and implement manufacturers in this and other southern lumber markets since the first of May, according to lumber manufacturers and wholesalers in Atlanta, who state that the reason for this lies in the fact that few orders for advance needs are being received. Practically all of the new business coming in is for current requirements only, manufacturers in the northern territory seeming to feel that prices are going to decline, and therefore holding off their advance buying for this reason.

Primary call is for thicker dimensions of white ash in the best grade, No. 1 common and select ash second, and the best grades of maple and elm reported fairly good. Prices as yet are unchanged.

Form Finance Company

NEW YORK, May 22—Freeman & Co., and associated interests, are organizing a new corporation, The National Transportation Lines Corp., which will finance the sale—and in some instances the operation—of motor buses, coaches and other types of automotive equipment it is declared here.

The corporation will be operated along lines similar to those governing the National Steel Car Lines Co., which was organized in 1920 by Freeman & Co., to finance purchases covering tank cars, refrigerator cars and other specialized types of railroad equipment for industrial companies.

Coming Feature Issues of Chilton Class Journal Publications

June 10—Automotive Industries Annual Engineering Issue.

Sept. 30—Automotive Industries Annual Production Issue

Annual A.A.A. Convention Has Important Calendar

WASHINGTON, May 24—The annual convention of the American Automobile Association will be held in Chicago on June 7 and 8, headquartered at the Palmer House, where the sessions and all committee meetings will be held. Approximately 800 delegates of motor clubs and associations affiliated with the national body are expected to attend.

Preceding the convention the various boards of the association will meet, including the Good Roads Board, the National Touring Board and the Legislative Board. Approximately thirty officers, in addition to the executive committee, will be nominated for election, including the president, six vice-presidents, secretary, treasurer and 21 members of the new board of directors.

Gas Tax Nets $4,904,518

MILWAUKEE, May 22—The 2 cent per gallon gasoline tax on the consumer in Wisconsin netted nearly $5,000,000 to the State highway fund in the first year of the operation of the law. The exact receipts were $4,904,518, indicating that 245,225,900 gallons of gasoline were sold in Wisconsin during the year. February is found the off-peak month and August is the peak month in receipts.

N.A.C.C. Export Men Seek Uniform Rates

NEW YORK, May 22—Export traffic managers of automobile companies, meeting at the National Automobile Chamber of Commerce this week, decided to meet there regularly in the interests of improved handling and shipping of automobiles to foreign ports. The object is to gather data and present to the steamship companies a common viewpoint on matters of general interest to automobile exporters and the shipping concerns.

A rate committee and a committee on the handling and stowage of automobile cargoes have been appointed. The rate committee will consider at once rates to the United Kingdom, which are considered high, and rates to the River Plate, which will be raised on July 1.

The handling and stowage committee will consider means of diminishing possibilities of damage occurring between the automobile cargo's removal from the freight car and its stowage in the ship's hold.

This conference, jointly sponsored by the traffic and export committees of the Chamber, will extend to foreign trade the principles under which the immense traffic of automobiles on railroads is now supervised through monthly meetings of factory traffic managers.

Modine Plant Expands

RACINE, May 22—Modine Mfg. Co is pushing work on a $50,000 manufacturing addition, consisting of two wings, 80 x 140 and 170 x 112 ft., which will cost nearly $100,000 with new equipment now being purchased.

Calendar of Coming Events

SHOWS

Berlin .....End of 1926
Brussels .....Dec.
Chicago .....Nov. 8-13
Coliseum, Automotive Equipment Association.
Chicago .....Jan. 29-Feb. 5
National, Coliseum, National Automobile Chamber of Commerce.
Geneva .....June 10-20
Third Annual Automobile, Motor Cycle and Cycle Exposition.
Lima .....July 28
First Peruvian Automobile Show, Under Auspices Peruvian Touring Club.
London .....Oct. 4-9
Olympia Motor Cycle.
London .....Oct. 21-30
Milan .....Sept.
Fifth International Road Congress and Exposition.
New Haven .....Sept. 7-10
Machine Tool Exhibition.
New York .....Jan. 8-15
National, Grand Central Palace, National Automobile Chamber of Commerce.
Paris .....Oct. 7-17
Auto Salon, Grand Palais.
Prague .....Sept.

CONVENTIONS

American Electric Railway Association, Cleveland Public Auditorium, Cleveland .....Oct. 4-8
Associated Manufacturers of Fabric Auto Equipment, Inc., La Salle Hotel, Chicago .....Nov. 13
Automobile Body Builders Association, Hotel Statler, Detroit .....June 8-10
Automotive Equipment Association, Mount Royal Hotel, Montreal, Canada..June 14-19
National Association of Automobile Show and Association Managers, Drake Hotel, Chicago .....July 27-28
National Automobile Chamber of Commerce, Factory Service Managers, Book-Cadillac, Detroit .....June 15-16
National Standard Parts Association, Hotel Sherman, Chicago ..... Nov. 15-19
National Tire Dealers Association, Inc., Memphis, Tenn. .....Nov. 16-18
Society of Industrial Engineers, Bellevue-Stratford Hotel, Philadelphia ..June 16-18
United States Good Roads Association, Inc., and Bankhead National Highway Association, Santa Monica, Calif..June 7-12

S. A. E. MEETINGS

National

Boston, Nov. 16-18, National Transportation and Service.
Chicago, Sept. 21-23, Production Engineering, Hotel Sherman.
French Lick Springs, Ind., June 1-4, Summer Convention.

RACES

Altoona .....June 12
Flag Day Races. Speedway.
Altoona .....Sept. 6
Labor Day Races. Speedway.
Atlantic City .....July 17
Atlantic City .....Sept. 25
Charlotte, N. C. .....Aug. 23
Le Mans, France .....June 12-13
Rudge-Whitworth 24-hour stock car race.
Los Angeles .....Nov. 25
Marseilles .....June 27
French Grand Prix, Miramas Track.
Salem, N. H. .....July 5
Salem, N. H. .....Oct. 12